

MARINE REVIEW.

VOL. IV.

CLEVELAND, OHIO, THURSDAY, SEPTEMBER 24, 1891.

No. 13.

Canada's Canal Policy.

When the commissioners appointed by the government of the Dominion of Canada and representatives of our own federal government meet in Washington shortly to consider the subject of reciprocal trade relations between Canada and the United States, it will be found that the Lake Carriers' Association, although proceeding without great display, has presented to the state department a very able statement relative to the tolls on the Welland canal discriminating against American vessels, ports and citizens. The document, which was prepared by Secretary Keep, has been forwarded to Hon. James G. Blaine, secretary of state, with a resolution urging the government of the United States to take prompt and energetic measures to secure full rights for American interests under the treaty of May 8, 1871. Article 27 of this treaty, known as the treaty of Washington, reads as follows:

"The government of Her Britannic Majesty engages to urge upon the government of the Dominion of Canada to secure to the citizens of the United States the use of the Welland, St. Lawrence and other canals of the dominion on terms of equality with the inhabitants of the dominion. And the government of the United States engages that the subjects of Her Britannic Majesty shall enjoy the use of the St. Clair Flats canal on terms of equality with the inhabitants of the United States."

The Canadian government has violated this article of the treaty by the imposition of tolls and the institution of a system of rebates on the Welland canal which discriminate against citizens of the United States and in favor of the inhabitants of the dominion. As regards the unfair system of grain tolls and rebates on the Welland, about which so much has been said of late, the lake carriers hold that "simple justice to American forwarders and vessel owners requires that on grain bound for Montreal the same tolls should be exacted at the St. Clair Flats canal that are exacted at the Welland canal on grain destined for ports of the United States." A very plain and complete statement is made to the state department of Canada's manipulation of canal tolls and rebates on grain in order to hold the business for Kingston and Montreal, but it is also shown that this is not the only discriminating feature in the canal management.

From the annual report of Canadian minister of railways and canals it appears that in the year 1890 there passed down the Welland canal to Canadian ports 368,839 tons of freight, of which 212,080 tons obtained a rebate of nine-tenths of the canal tolls. During the same season there passed down the canal to United States ports 327,833 tons of freight on which only 16,433 tons obtained any rebate whatever. It also appears that in the year 1890 there passed down the Welland canal in Canadian vessels 326,149 tons of freight of which 184,275 tons obtained a rebate of nine-tenths the tolls exacted at the canal. During the same season there passed down the canal in United States vessels 362,477 tons of freight, of which only 52,459 tons obtained any rebate whatever. On traffic up the canal no rebates of tolls were paid, but of such traffic up the canal in the year 1890, 251,342 tons was bound to American ports and only 38,724 tons to Canadian ports. Of this traffic 217,726 tons was carried in American vessels and only 72,340 tons in Canadian vessels. It also appears in the report that during the year 1890, 178,988 tons of coal was carried up and 23,393 tons of coal was carried down through the Welland canal. Of the coal carried up 161,648 tons was carried

between ports of the United States; 92 tons was carried between Canadian ports and 17,280 tons from a United States to a Canadian port. It will thus be seen that the up traffic in coal through the canal consisted almost entirely of a movement in the United States coastwise trade, and was therefore necessarily carried in United States vessels. On this up movement of coal full tolls of 20 per cent. per ton were exacted. Of the down movement of coal, however, 22,781 tons was carried to Canadian ports and all of this was carried in Canadian vessels. Only 515 tons of coal was carried down through the canal in an American vessel or to an American port. On the 11th of April, 1890, the Canadian government issued an order reducing the toll on coal passing down the canal from 20 cents to 10 cents per ton, but leaving the full toll of 20 cents on coal bound up the canal. It also appears from this official report that of the Montreal grain transferred at Kingston during the season of 1890, 184,275 tons was carried to Kingston in Canadian vessels and 35,560 tons in vessels of the United States.

These facts show clearly a violation by the Dominion government of both the spirit and letter of the article referred to in the treaty of Washington, as it is evident that the intent of the article is to secure the use of the canal on equal terms not only for American vessels but for American ports, consumers and business interests. In the coal traffic through the canal the discrimination against American consumers is as important as in grain. The west-bound coal is nearly all carried between United States ports, and therefore necessarily on American vessels. Twenty cents a ton is exacted on this traffic. The same commodity when carried through the canal east-bound is nearly all carried to Canadian ports and on Canadian vessels. By an order in council made last year only 10 cents a ton is exacted thereon.

The coming conference affords opportunity for a settlement of this whole matter and the Lake Carriers' Association, representing the organized vessel owners of the lakes, has presented the question in full and in a very forcible manner to the state department.

Seeking a Master's Certificate.

EDITOR MARINE REVIEW:—Can you inform me what book, and also the price of same, that will be of some help to me in studying navigation, as I am preparing for examination for a master's certificate.

FRANK LAMB,

Toledo, Ohio.

[In examinations before government inspectors on the lakes the applicant must have a knowledge of headlands and prominent landmarks on the routes over which he seeks application to sail. Practical information regarding courses, ranges in all parts of the rivers, and depth of water on reefs is also of the highest importance. The science of navigation has no part in these examinations. If our correspondent has not as yet made a study of lake charts, learning the method of getting courses, variations, etc., it is absolutely necessary that he should do so. Charts can be borrowed during the winter months from any of the vessel masters. A study of "Scott's Coast Pilot" for the lakes compiled by Capt. George Scott, No. 115 Baldwin Avenue, Detroit, Mich., is of considerable assistance in preparing for examination in this regard, just as it is of service to masters. This publication can be secured from the author or the MARINE REVIEW at \$2 and it is given with a year's subscription to the REVIEW at \$3.—ED.]

Ore Shipments and Lake Freights.

With the assistance of Cleveland ore dealers the MARINE REVIEW is enabled to present the total of iron ore shipments from Lake Superior mines to Sept. 1. On that date the output from the different upper lake ports, Ashland, Two Harbors, Marquette, Escanaba and Gladstone, aggregated 3,954,510 tons, as against 5,459,510 tons on Sept. 3, 1890, or a decrease during the present season of 1,505,000. The figures are from official sources and can be relied upon as entirely correct. The decrease is about equal to the shortage as compared with last year, with which the season began, on account of the delay until about June 1 in the beginning of the ore movement this year, and it will thus be seen that the movement since June 1 is about equal to that of 1890 during the corresponding period. Lake shipments from Sept 1 last season to the close of navigation footed up nearly 3,000,000 tons, as the total output of the mines, including all-rail shipments, was a trifle over 9,000,000 tons, but it is not at all probable that a similar pace, about a million a month, will be kept up for the remainder of this season, as the shipments of the present month must show a big falling off, on account of tonnage attracted to the grain trade by high rates that have prevailed for several weeks past. There is no unsold ore being brought down, on account of the high freights, and it can be safely said that there is not 5,000 tons of ore on all Lake Erie docks that has not been sold. Odd lots that have lain on the docks for two or three years have all been sold, and there is no disposition among ore dealers to take the chances of last year in bringing down ore that had to be charged off their books later at \$1 to \$1.50 a ton lower than the prices at which it was inventoried. Ore companies owning lines of vessels seem to be adhering strongly to this policy, as their boats are carrying grain in some instances. The boats of the Republic Iron Company, as well as those controlled in the office of M. A. Hanna & Co., have all taken cargoes of grain and the Minnesota company's steamers are being sent on triangle trips, Two Harbors to South Chicago and Chicago to Buffalo. Still it is evident that in event of a possible collapse in the grain movement, with a lowering of freights, a blockade from Buffalo or beyond the receiving points at upper lake ports, or from any other cause, the demand for more ore at Lake Erie ports would furnish support for a continuance of activity in shipping, as furnacemen would in all probability increase their purchases on a moderate lake freight increase, and the docks are in better shape to receive ore than they have been during any fall for several years past. In any event, the situation is decidedly encouraging to the vessel interests, as there is every assurance of grain shipments next spring and short supplies of ore for consumption during the winter. Ore freights are \$1.05 from Escanaba, \$1.20 from Marquette and \$1.40 from Ashland, with the market advancing to a basis equal to the grain rates.

The distribution of coal through the northwest from upper lake ports is being neglected, on account of the demand for cars to carry grain, and in some portions of the producing districts there is a shortage of coal as well as a shortage of cars. Vessels desiring coal cargoes have been compelled to go up light from Buffalo and Ohio ports. The rate from Ohio ports to the head of Lake Superior has, accordingly, been weak and 45 cents has been accepted in a few cases. Lake Michigan rates, excepting on two or three cargoes taken for Gladstone at 40 cents, remain unchanged at 50 cents to Chicago, Milwaukee, Manitowoc and Green Bay, and 45 cents to Escanaba.

Duluth is not offering more than 4 cents on spot tonnage or tonnage to arrive for wheat, but the grain movement shows no signs of letting up. On a few cargoes of hard lumber from Washburne to Chicago, odd lots, \$3.50 has been paid, but the regular rates from the head of Lake Superior are \$2.75 to Chicago and \$2.50 to Buffalo. Saginaw bay lumber rates are still based on \$1.75 from Bay City to Tonawanda and \$1.50 from Bay City to Cleveland.

Useless Guns and Rockets.

Mr. C. H. Keep, secretary of the Lake Carriers' Association, will go to Washington next week to attend the special meeting of the board of supervising inspectors of steam vessels on the 28th inst., when the question of equipping lake vessels as well as the vessels of the coast with guns and line carrying projectiles will be considered. He will take with him letters from vessel managers, masters and marine underwriters in different parts of the lakes showing that the law it applied to the lakes will be uncalled for, as the appliances would be altogether useless. Formal resolutions from the board of managers of the Lake Carriers' Association to the supervising inspectors asks that a report in favor of the repeal of the law be made on the following grounds:

"Because in case of fire on board a steam vessel the explosives carried in connection with such apparatus would increase the risk of fighting the fire and would endanger the vessel and the lives of those on board. Because the attempted use of the apparatus on the deck of a wrecked vessel and in the hands of men entirely unskilled in the care or use of the apparatus, would almost certainly result in more lives lost than saved. Because without trained assistance on shore the successful firing of the gun would be useless, and in case such trained assistance were present it would be unnecessary. Because the whole history of marine casualties on the lakes fails to show even one instance where life lost might have been saved had the wrecked vessel been equipped with the apparatus in question. Because there is complete unanimity of opinion among owners, managers, masters, and all who are acquainted with lake navigation that the law requiring steamers to carry guns or rockets is impracticable and uncalled for, and that such appliances would be altogether useless."

Little Hope of a Race.

Ashley & Dustin, of Detroit, managers of the side-wheel steamer Frank E. Kirby, running between Sandusky and Detroit, and credited with being the fastest boat on the lakes, write the MARINE REVIEW confirming what has been said about their having deposited \$300 with the owners of the Sandusky Register for a race between the Kirby and the steamer City of Toledo, recently built by the Craig Ship Building Company of Toledo and fitted with horizontal triple expansion engines by the Cleveland Ship Building Company. Talk of a race between the two boats has been indulged in ever since the City of Toledo came out this season, and now Ashley & Dustin say to the REVIEW: "If Calvin Cone, manager of the City of Toledo, or any other person deposits \$300 with you, or any other amount of money let us know." It is unfortunate, however, that there is no hope of a race this season, as the City of Toledo will probably not be in shape for a contest of the kind proposed this fall.

Novel Wrecking Tug.

The Davis Coast Wrecking Corporation of New Bedford is having a large wrecking tug constructed which will, among other things, have a steam windlass capable of handling 2-inch chain with a pair of 10x10-inch engines, and also a large steam capstan with a pair of 8x8-inch engines for handling heavy hawsers. The windlass is also fitted with a large drum for handling large hawsers. The principle of this tug is, that with its 8,000 pound anchor out and the chain and hawser perfectly taut, the action of the waves will be such on the bottom of the tug as to gradually pull the vessel off and make it more effective than a large number of ordinary tugs would be at the same work. As the waves slacken the hawser, the steam windlass would take it up, and this would be repeated as often as the waves under the tug lifted her. The American Ship Windlass Company of Providence, R. I., is building the steam windlass and steam capstan for her.—Marine Journal.

CHICAGO LAKE INTERESTS.

WESTERN OFFICE, MARINE REVIEW,
No. 210 So. Water Street, CHICAGO, ILL., Sept. 24.

What a change has come over shipper and vessel agent this month! In early summer the vessel agent with a boat to charter went on 'change, feeling that he would rather steal a sheep than humble his pride before the autocratic shipper. He was trampled upon, his boat was loaded at as many elevators as the shipper asked, and any protest met with a contemptuous reception. Now it is different. The shipper comes to the vesselman and accepts terms, does not make them. I was most forcibly struck with this change the other day. A grain shipper enters the vesselman's office, slapped him on the shoulder in the most friendly way, and offered him a cigar. "It will be a great accommodation to me, etc." he said. This same shipper I saw enter this same agent's office in June, with all the airs of the king of the Hottentots, and make a furious kick over some trifling affair. Don't you believe the vesselmen do not enjoy the change. Down on the lumber market it is not this way. The man who has a boat to charter has to beg for the privilege of existing; his very presence on earth seems a contempt of court. Since the Seamen's Union has put up sailors' wages to \$2.50 per day, he would have no defense to that charge. The lumber hookers are now running on the same principle that a man buys a lottery ticket—something may turn up if they run; mortgages are sure to turn up if they quit.

You have read of the E. C. Pope's big load of corn—125,990 bushels. She will better it the next trip, it is said. The Pope received general praise as a steamship. The John W. Moore was also the recipient of many a nice word as she passed up and down the river. If the next five years bring as many changes in the lake marine as the last five have, where will we be? Perhaps THE REVIEW can solve the question. With twenty feet of water from lake to lake the change will be marvelous. If this vast improvement requires less than \$4,000,000 Congress can do the country no greater service than to make the appropriation right away. It is useless to argue against the improvement that lake harbors have not that amount of water. When there is twenty feet of water on the lakes the harbors must have it, too. The right way is to improve the lakes first, and then see to the harbors.

Sept. 26, the date of expiration on the time allowed the city of Chicago to remove Canal street bridge, is nearly here, and the bridge has not been touched. The Lake Line Agents' Association protested Tuesday against any extension of time by the war department. The question of government control of Chicago river has to be fought out, and the sooner the fight begins the better. A better case for the marine interest will never be found than Canal street bridge.

Collector Clark is hard at work endeavoring to secure a fine naval display at the Grant monument ceremonies. He asks the cordial co-operation of vesselmen around the lakes in making an impressive display on that great occasion.

The man-of-war Michigan is here, and will remain in this vicinity until after Oct. 7, when the Grant monument at Lincoln park is to be unveiled. Thus far this season she has recruited about eighty boys for the navy. The boys must find their initiation into naval life anything but pleasant, as they are sent below, and kept there. The frame of the Michigan's engine must be replaced, as it is becoming shaky. The engine itself is as good as the day it came out. A frame that has stood since 1844 deserves to be retired on half-pay.

Edward Warner, Dunham's night superintendent, bought the old schooner Orkney Lass, after she had been stripped. What he is going to do with her no one knows, as he steadfastly declines to be interviewed.

Canadian Marine.

Special Correspondence to the MARINE REVIEW.

KINGSTON Ont. Sept. 24.—The keel of the new steel tug for the Collinsby Rafting Company has been laid. The tug will be ready for next season's operations. She cost about \$35,000.

The Kingston and Montreal Forwarding Company last week pressed into service an old elevator that had not been used for years. The forwarders are determined not to delay vessels coming here with grain. Probably never before was there such quick dispatch as this season.

The small fore-and-after Two Brothers is ashore on Amherst island with 2,000 bushels of rye in her. It is thought she can be hauled off without sustaining any serious damage.

The steamer Princess Louise, implicated in the sinking of the schooner Cora Post recently, is still under seizure. Action will be taken against the St Lawrence River Steamboat Company for the value of the Post. Capt. Rathwell owns her but she was chartered by the steamboat company.

Two shortages occurred recently. The Armenia's cargo of 25,000 bushels of rye from Toledo was 80 bushels short and the Grantham's 70 bushels in 13,000. The question arises Is Kingston or Toledo to blame? The slightest shortage takes the cream off rates nowadays.

The schooner Jessie Breck, which foundered last year with all hands near here, has been sold to Christie & Thompson of Toronto. She

will be overhauled before being sent west. The Jessie has earned considerable money in her day. Next season she will enter the lumber trade.

A new river barge, the Alberta, has been launched by the Montreal Transit Company. She will carry 25,000 bushels.

Capt. W. Power of this city has furnished the model of a grain carrying vessel which he calls a turtleback. It is after the design of a whaleback. The ends are blunt so that with the same length of keel as the latter it has greater carrying capacity and no room is wasted. Whether it will supersede the whaleback is yet to be seen.

Calvin & Co.'s new schooner Ceylon has been successfully launched. She is 207 feet over all, 37 feet beam and 15 feet 2 inches depth of hold. She will at once enter the grain trade between here and Duluth and be commanded by Capt. A. Miligan. On board is a steam pump which throws 8,000 gallons per hour. The Ceylon is the only large schooner built in this province this year.

Duluth Grain Movement.

Special Correspondence to the MARINE REVIEW.

DULUTH, Minn., Sept. 24.—Grain carriers have been busy here the past week, no less than 1,779,000 bushels of wheat having gone out from this market. Charters for this week call for shipments of nearly as much more. Wheat rates to Buffalo are now up to 4 cents for spot, as well as for boats loading during this month. Shipments are keeping well up to the big receipts, under a splendid demand from the east and from Europe. The movement of wheat this way from the country has been about as heavy as the railroads can take care of and has been fully up to expectations. The movement by days last week was as follows:

	Receipts, bu.	Shipm't bu.
Monday.....	617,809	223,284
Tuesday.....	400,048	417,555
Wednesday.....	303,207	452,022
Thursday.....	378,974	113,209
Friday.....	257,009	185,909
Saturday.....	316,320	387,398
Total.....	2,273,367	1,779,377
Last year.....	815,268	159,105

At Minneapolis receipts for the week were 1,549,930 bushels and shipments 393,200 bushels.

West Bay City Ship Yards.

Special Correspondence to the MARINE REVIEW.

WEST BAY CITY, Mich., Sept. 24.—Still the talk of new vessels goes on. The latest is that Capt. Davidson will build, in addition to the huge propeller now under way, a schooner similar to the Baltic, and perhaps two of them. At Wheeler & Co.'s the keels for two of the government light-ships have been shifted from their original position, the track for the Brown hoisting apparatus has been extended and new foundations put under it, and everything points towards a very active season. Mr. Wheeler is now east on business. It is more than likely that he will build the yacht for which he has plans prepared.

The propeller S. C. Clarke, which was without an owner at Chicago for several days, has been brought here, and will be thoroughly repaired during the winter. The repairs to the Monohansett at Davidson's yard are completed, so far as that yard is concerned for the present, and the vessel is now at the Bay City dry dock for the work on the hull.

The F. & P. M. No. 2 will be almost a new boat from the water-line up when Wheeler & Co. finish their work on her, and in addition a large portion of the hull will have been replaced with new timbers.

Gen. Mead Did Not Find Roumania Shoal.

EDITOR MARINE REVIEW:—Capt. Cowley of the steamer Roumania must have misunderstood me as to the shoal that he struck being found by the United States survey officials. If it had been found when the survey was made it would be on the charts. It was found by fishermen from Scott point about 1870. It is a dangerous spot, however, and it is a wonder to me that some of the deep laden fellows did not strike it before this. I have a letter from Commander Nicol Ludlow, U. S. N., saying that this spot as well as the shoal at the north end of Squaw island will be buoyed. I hope you will print this letter in your valuable paper, as I am quite certain that this rock or shoal was not discovered by Gen. Mead while in charge of the survey in these parts.

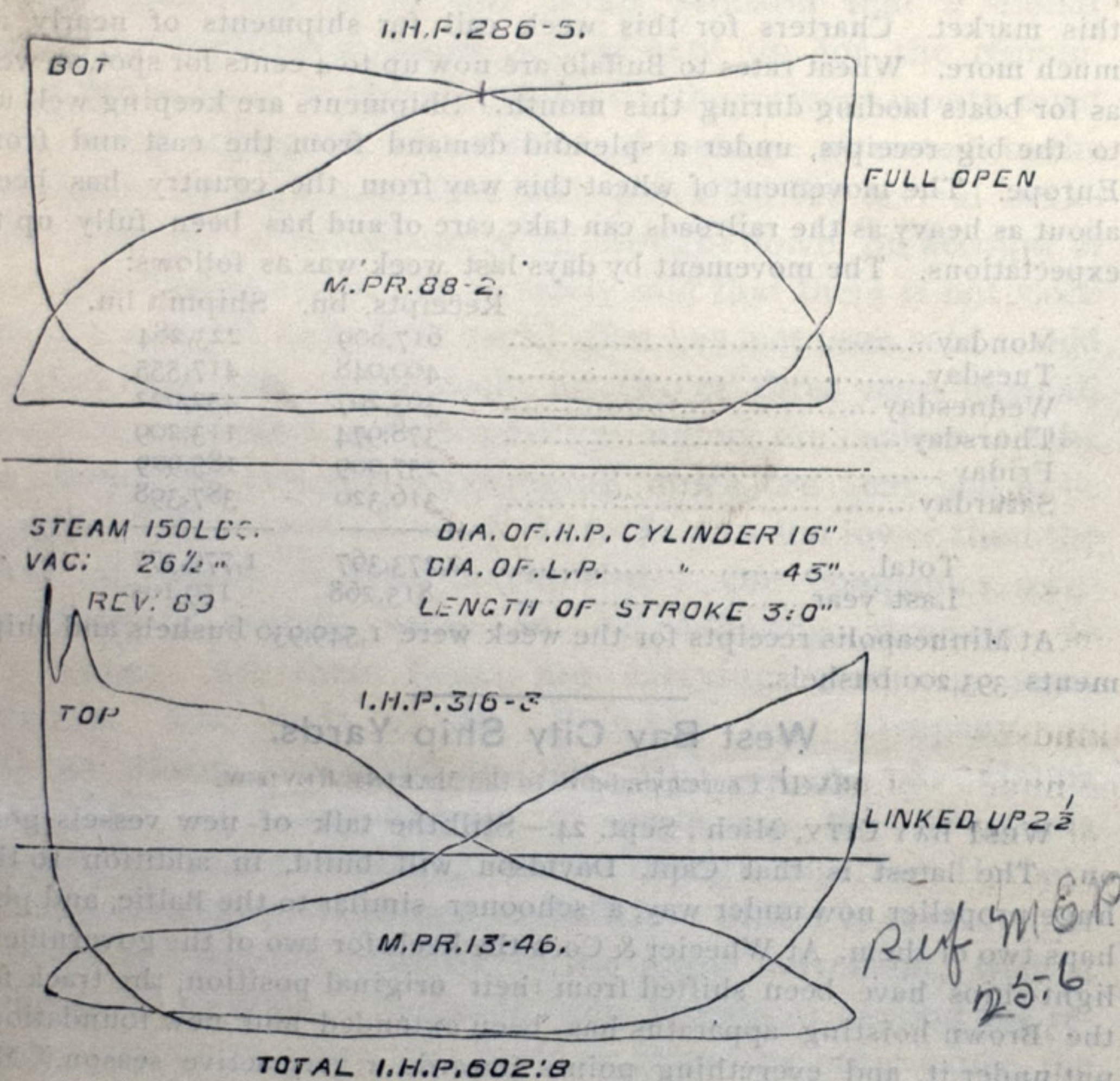
E. A. BOUCHARD,
Cheboygan, Mich., September 15. Tug Duncan City.

Official Numbers and Tonnage.

The bureau of navigation, W. W. Bates commissioner, assigned official numbers to the following lake vessels during the week ending Sept. 12: Steam—Alice, Grand Haven, 44.05 tons gross, 32.51 net, No. 106,884; Argyle, Buffalo, 41.34 tons gross, 20.67 net, No. 106,886; G. M. A. Hereman, Milwaukee, 34.46 tons gross, 17.23 net, No. 86,171. Sail—Ina, Chicago, 10.87 tons gross, 10.33 net, No. 100,503; Morning Glory, Detroit, 6.29 tons gross, 5.98 net, No. 92,325; Sunbeam, Cleveland, 7.20 tons gross, 6.84 net, No. 116,442.

Reverting to Two Cylinders.

The Engineer of London, one of the leading technical publications in England, presented in a recent issue engravings of the machinery of the steamship *Minho*, owned by Messrs. Leyland & Co., and designed by Mr. Evans, superintending engineer for this company. A remarkable departure from modern practice is shown in the engines as the builders have reverted to the use of two cylinders. Indicator cards presented in connection with the engravings of the engines are shown here. The Engineer says of the machinery: "The engines of the *Minho* instead of being of the triple expansion, are of the compound type. At the first glance engineers and ship-owners alike may be disposed to regard this departure from normal methods of construction as a distinct mistake; but further examination will throw doubt on the soundness of this conclusion. The cylinders are not proportioned as in ordinary compound engines. On the contrary we have here the high and low pressure cylinders of a triple expansion



sion engine, the intermediate cylinders being suppressed. The cylinders are 16 inches and 43 inches in diameter, the piston areas being respectively 201 square inches and 1,452 square inches. Had a third cylinder been used, its piston area would have been about 706 inches in area corresponding to a diameter of about 30 inches. The volume of the small cylinder is to that of the large as 1 is to 7.22. The usual pressure for compound marine engines is about 90 pounds, but the boiler of the *Minho* carries 150 pounds. The total range of expansion in any engine is measured by the volume of steam admitted per stroke into the high pressure cylinder, and the volume which it occupies at the instant the exhaust port on the low pressure cylinder opens. Assuming that the cut-off takes place a little before half stroke in the high pressure cylinders of the *Minho*, the total range of expansion would be 14 to 1, and it appears to be doubtful that any economy could be gained by pushing the ratio of expansion to 150 pounds steam further. The presence or absence of an intermediate cylinder can in no way affect the amount of expansion, except in so far as it may influence the amount of condensation and re-evaporation. We have next to consider whether, under the conditions, a triple expansion engine would have been better or worse than the engine which we illustrate

"We may deal with this question from two points of view, that of commerce, and that of science. Taking the practical aspect of the problem first, we know that the shipowner has but one standard of efficiency, viz., the earning-power of a ship. There is a certain fixed rate of speed at which experience tells him his ships will earn more than they will at any velocity higher

or lower. This will vary with the conditions of trade and length of the voyage. To shorten the duration of a voyage effects economy in one direction. The augmented cost of propulsion diminishes it in another direction. Let us for the sake of argument assume that about 10 knots is the most generally useful speed for a cargo steamer, then that machinery will be the best that moves a ton of cargo at that speed at the smallest cost. In estimating the cost of fuel constitutes but one item. The first cost of the machinery and the outlay on its upkeep are very important items. Again, the cargo space left available after the engines, boilers and coal are of maximum importance when measurement or other light goods are carried. Applying these considerations to the case of the *Minho*, we see that her machinery costs less than would a triple expansion engine. The cost of repairs is smaller, the cost of oil, packing, brasses and engine room stores of all kinds is less, and the engine room being shorter the cargo space is augmented. It follows that even if the compound engine burned a little more coal per indicated horse-power than would suffice for a triple expansion engine, there is an important saving in other respects to be set against a larger coal bill. Messrs. Leyland & Co. understand their business perfectly, and we may take it for granted that they would not have ordered nine sets of compound engines in five years unless they had satisfied themselves that the results obtained were in all respects satisfactory.

"Turning now to the scientific side of the question, which concerns itself solely with the cost in fuel of an indicated horse-power, the cost of the machinery, etc., we may ask Is it certain that a triple expansion engine would be more economical than a compound engine? There is reason to doubt that anything whatever would be gained by the use of a third cylinder. For some years after the triple expansion engine came into use it was generally held that its superior economy was due to diminished condensation in the cylinders, the diminution being the result of the limitation of range of temperature in the cylinders. In other words what came to be known as the "heat trap theory" was accepted as competent to explain everything. From the first we have refused to accept this theory as sound, and it is very seldom heard of now. Professors Kennedy's experiments with the *Meteor* and other steamships may be said to have given it its death blow, because these experiments showed that the cylinder condensation is practically unaffected by the number of cylinders, and is probably greater in the triple expansion than in any other form of engine. The main, although not the sole cause of economy in the triple expansion as compared with the compound marine engine, lies in the greater range of expansion rendered possible by the heavy pressure carried. It may be shown, indeed, that a direct relation exists between the pressure and the consumption of fuel, largely irrespective of the type of engine employed.

"If, now, the saving in fuel is due mainly to the augmented pressure and range of expansion, it follows that a compound engine working under the same conditions of pressure and expansion as a triple engine, ought to be yet more economical, because the total weight of metal to be heated and cooled at each stroke is reduced by the suppression of one cylinder. The ratio of the net to the indicated horse-power ought also to be increased by the elimination of the frictional resistance of one engine. We have, then, only to consider finally whether it is possible to make an engine which can endure without injury the considerably augmented pressure thrown on the low pressure piston. The answer to this is conclusive. The experience of the builder in this case during the last four years proves that there is no trouble of any kind incurred from this cause. The result is just what might have been anticipated from information acquired from tandem engines. In Woolf engines, again, where there is no intermediate receiver, the steam is exhausted at a very considerable pressure from the small cylinder almost without reduction into the low pressure cylinder, but no trouble is experienced from this heavy initial stress. It is simply a matter of proportion of parts."

"A review of all the conditions and circumstances then leads us to look with much favor on Mr. Evans' method of construction. We do not believe that it is suitable for large powers, because it is not expedient to put too much work on a single pair of cranks, but we do not see any other objection. The saving in space, weight, first cost, and upkeep can not, we think, fail to be considerable; sufficient for cargo steamers at all events to outweigh any small extra consumption of fuel, even if that is found necessary, which for reasons stated we much doubt."

Record of Speed and Big Cargoes.

[Masters or owners are invited to report improvement on this list.]

Iron ore: Lake Michigan—Maryland, Inter-Ocean Transportation Company, of Milwaukee, 3,322 gross, or 3,737 net tons, Escanaba to South Chicago, draft 16 feet 6 inches; E. C. Pope, Dry Dock Navigation Company of Detroit, 3,221 gross, or 3,608 net tons, Escanaba to Ashtabula, draft about 16 feet. Lake Superior—E. C. Pope, Dry Dock Navigation Company, of Detroit, 2,828 gross, or 3,167 net tons, Ashland to Lake Erie, draft 14 feet 6 inches.

Grain: E. C. Pope, Dry Dock Navigation Company of Detroit, 125,990 bushels of corn, draft 14 feet 8 inches; Western Reserve, Peter Minch, of Cleveland, 112,317 bushels of wheat, Chicago to Buffalo; W. H. Gilcher, J. C. Gilchrist, of Cleveland, 114,982 bushels of corn, Chicago to Buffalo.

Speed: Owego, Union Line, of Buffalo, Buffalo to Chicago, 889 miles, 54 hours and 16 minutes, 16.4 miles an hour; Saranac, Lehigh Valley Line, of Buffalo, Buffalo to Lime-Kilns, 240 miles, 15 hours and 10 minutes, 16 miles an hour; E. C. Pope, Dry Dock Navigation Company of Detroit, Sault Ste. Marie to Ashland, 22 hours and 38 minutes, or 15.4 miles an hour.

Iron Mining.

VALUE OF LEADING STOCKS.

Quoted by Chas. H. Potter & Co., No. 104 Superior St.

Stocks.	Par Value.	Bid.	Asked.
Cleveland-Cliffs Iron Company.....	\$100 00	\$.....	\$ 80 00
Champion Iron Company.....	25 00	.....	80 00
Chandler Iron Company.....	25 00	37 00	39 00
Chicago and Minnesota Ore Company.....	100 00	.....	100 00
Jackson Iron Company.....	25 00	.....	110 00
Lake Superior Iron Company.....	25 00	55 00	.....
Minnesota Iron Company.....	100 00	75 00	.....
Pittsburg Lake Angeline Iron Co.....	25 00	132 50	.....
Republic Iron Company.....	25 00	25 00	27 00
Ashland.....	25 00	.....	53 50
Section Thirty-three.....	25 00	10 00	11 50
Brotherton.....	25 00	2 25	2 75

Ashland shipments of the different Gogebic mines up to and including Wednesday, the 16th inst., were as follows: Ashland 190,445 tons, Aurora 64,182, Tilden, No. 2, 5,179, Tilden 23,044, Montreal, south vein, 49,410, Palms 28,279, Section 33, Bessemer 30,056, Carey 66,341, Trezona 15,759, Germania 20,653, Iron Belt 1,506, Mount Hope 68,942, Norrie 213,610, East Norrie 95,393, Father Hennepin 14,582, Federal 929, Eureka 12,752, Pabst 71,187, Ruby 913, Sunday Lake 43,185, total 998,726 tons.

IRON-ORE mining in the Lake Superior region must yield extraordinary large profits. The lake Angeline Company, par value of stock \$25, pays a monthly dividend of \$2 a share, nearly 100 per cent. a year. The Champion Iron Company's stock, par \$25, is quoted at \$87.50. The Chandler Company, par \$25, is quoted at \$37 to \$39. For the Jackson company's stock, par \$25, \$90 is bid. The Lake Superior, par \$25, with \$51 bid. The Lake Angeline, par \$25, with \$132.50 bid. These are very encouraging figures to owners of southern Bessemer ore properties.—Manufacturer's Record. The foregoing is evidently taken from the stock quotations printed by the MARINE REVIEW. It might be well to call the attention of the Record to the fact that these are the leading properties of the Lake Superior region and that the list selected includes nearly all of the dividend payers. Millions have been sunk in hundreds of other holes in the ground.

From the Vermillion Iron Journal of Tower, Minn., it is learned that W. H. Stowell, T. B. Hoover, D. T. Adams, T. H. Pressnell, J. B. Geggie and F. I. Tedford of Duluth are members of a company recently organized with a capital of \$100,000, to engage in the work of separating and concentrating magnetic ores. The company has purchased the Minnesota right of the Finney process and will shortly begin operations on both the Mesaba and Vermillion ranges. It is claimed that with the Finney machines, now in operation in Welden N. Y., magnetic ores of a grade below 50 per cent. in metallic iron can be brought up to 69 per cent. at a cost not exceeding 25 cents a ton.

On Thursday last, the 17th inst., the Minnesota Iron Company had shipped from Two Harbors 395,814 gross tons of ore and the Chandler 270,642 tons. The Minnesota still holds a little more than 30,000 tons in stock but this will all be moved and the output will be as large as it is possible to make it. At the Chandler, however, work on the stock pile has been discontinued and only about 2,000 tons a day of ore raised from the mine will be shipped.

Edmun C. Pechin, who is well known to the iron ore producers of Lake Superior, has an article in last week's issue of the Engineering and Mining Journal of New York on the "Mining of

Potsdam Brown Ores in Virginia." The workings are all open cuts and Mr. Pechin says he uses the word "Mining" in his article simply for convenience sake. Quarrying or digging would be better words.

At the Detroit mine the pumps have been taken out, together with all machinery, pipes, etc., of any value. The mine will probably never be worked again, as no considerable amount of merchantable ore can be found. There is undoubtedly ore on the forty acres south of the Detroit owned by the Cleveland Iron Mining Company, at least the late workings in the Detroit on the south side of the property indicated ore.—Ishpeming Democrat.

The steam shovel "Iron King," built by the Vulcan Iron Works of Toledo, O., and in use at Ishpeming is capable of handling from stock pile to cars 2,800 tons of hard or 3,800 tons of soft ore in ten hours.

Explorers are numerous on the new Wisconsin range, west from Hurley to Mineral lake in the Penoque hills. Some good finds are reported.

English Insurance.

Steel boats on the lakes with probably two or three exceptions are now insured almost entirely in Lloyds of London. The visit of John J. Millbank, naval expert, to Cleveland in connection with the raising of the Pontiac from the Sault river, will serve to show a part of the system followed when a loss is reported to the institution known as Lloyds on any of the thousands of vessels in all parts of the world on which the English underwriters hold millions in risks. An organization known as the salvage association and holding charter under the highest English authority is supported mainly by the underwriters doing business at Lloyds, although it is in reality not a part of the insurance organization. This salvage association maintains a large army of clerks and correspondents and furnishes information of all kinds in connection with marine insurance. It lists also a large number of naval experts, who are recognized as men capable of going to any part of the world and, as agents for the underwriters, representing their interests when a loss occurs. Mr. Millbank is the senior officer in this line of work and has been engaged in it for twenty years past.

The Pontiac, like all other lake vessels insured at Lloyds, was placed with the English underwriters through Johnson & Higgins, insurance brokers of Wall street, New York, who have connections in London, and who were instigative some time ago in bringing to the lakes some of the underwriters who, after a personal investigation of lake vessels and the method of doing business here, have taken these risks and have probably found others among their associates willing to join them. The New York brokers have also placed big fire risks in England, and through their plan of operations manage to evade state laws requiring a deposit with the state treasurers of security for policy holders. There is little fear of the insurance being all right as far as the vessel business of the lakes is concerned, however, and the Englishmen have accordingly secured a big line of business on the best hulls, on account of low rates and a broad policy. One of the requirements in all policies is that the New York brokers be immediately notified in event of any loss to the vessels insured. In the case of the Pontiac, notification of her loss was cabled to London and posted at Lloyds. A meeting of the interested underwriters followed this proceeding and they wired Mr. Millbank, who was then in New York, looking after another wrecked vessel, to take charge of their affairs with the owners. He was delayed in doing so, however, and made a trip to and from London before complying with the request of the underwriters.

Mr. Millbank will probably advise the people at Lloyds on his return to England that their rates of insurance on the lakes are too low. He claims that the English policy covers more than the ordinary policy on the lakes and adds that a profit can not be made at present rates.

MARINE REVIEW.

DEVOTED TO THE LAKE MARINE AND KINDRED INTERESTS.

JOHN M. MULROONEY, } PROPRIETORS.
F. M. BARTON, }
HOMER J. CARR, - - - Associate Editor and Manager Chicago Office,
210 South Water Street.

Published every Thursday at No. 510 Perry-Payne Building, Cleveland, O.

SUBSCRIPTION—\$2.00 per year in advance. Convenient binders sent, post paid, 75 cents. Advertising rates on application.

The books of the United States treasury department contain the names of 3,510 vessels, measuring 1,063,063.90 tons in the lake trade. In classification of this fleet the lakes have more steamboats of 1,000 to 2,500 tons than the combined ownership of this class of vessels in all other sections of the country. The classification is as follows:

Class.	Number.	Tonnage.
Steam vessels	1,527	652,922.25
Sailing vessels.....	1,272	328,655.96
Canal boats.....	657	67,574.90
Barges.....	54	13,910.09
Total.....	3,510	1,063,063.90

According to the report of William W. Bates, United States commissioner of navigation, 46 per cent. of the new tonnage of the country was built on the lakes during 1889. This is a percentage greater than the work of the Atlantic coast and western rivers combined, and almost equal to the whole work on the Atlantic and Pacific coast. In 1890 the tonnage built on the lakes is but very little less than that built on the Atlantic and Gulf coasts. Tonnage built on the lakes during the past five years was as follows:

	No. of boats.	Net Tonnage.
1886.....	85	20,400.54
1887.....	152	56,488.32
1888.....	222	101,102.87
1889.....	225	107,080.30
1890.....	218	108,515.00
Total.....	902	393,597.03

Annual tonnage entries and clearances of the great seaports of the world, for 1889: New York, 11,051,236 tons; all seaports in the United States, 26,983,315 tons; Liverpool, 14,175,200 tons; London, 19,245,417 tons.

Tonnage passing through Detroit river during 234 days of navigation in 1889, amounted to 36,203,606 tons. Ten million tons more than the entries and clearances of all the seaports in the United States, and three million tons more than the combined foreign and coastwise shipping of Liverpool and London.

St. Mary's Falls and Suez canal traffic: Number of boats through St. Mary's Falls canal in 1890, 234 days of navigation, 10,557; tonnage, net registered, 8,454,435. Number of boats through Suez canal during 1890, full year, 3,389; tonnage, net registered, 6,890,014.

Entered at Cleveland Post Office as Second-class Mail Matter.

SHIP YARDS of the lakes will without doubt find work enough to keep large forces employed during the coming winter, although the output of new tonnage will hardly be as great as during the past several years. A number of new freight boats as well as several costly passenger steamers will be built, however, as soon as owners and builders come together on prices. This is settled by the improvement in fall rates, and it is only a matter of a few weeks until contracts are announced. We hear of one iron builder having furnished figures to as many as ten parties, and it is more than probable that something will come from these negotiations. From the office of the American Steel Forge Company, West Superior, it is announced that at least eight whalebacks, four of them steamers, will be built for lake service during the winter.

Now that the St. Clair river tunnel between Sarnia and Port Huron, a portion of the system of the Grand Trunk Railway, has been opened, with the announcement that no other railway company will be debarred from using it, it remains for the Michigan Central to follow the example set in this enterprise, and quit its legislative schemes for a bridge across the Detroit river, against which the most eminent engineers in the army service have three times reported adversely. The St. Clair tunnel, which is more than a mile in length and cost \$2,700,000, is a grand triumph of engineering skill and will stand as a lasting

monument to the enterprise of the Grand Trunk and the ability of Engineer Joseph Hobson.

WITH Chicago recording shipments by lake of 747,000 bushels of grain in a single day, (Saturday last) and Buffalo's receipts over Sunday and Monday aggregating about 2,000,000 bushels, it can truly be said that this is a big country and a loss in one line of trade is invariably made up in another. While lake transportation interests were depressed, almost to ruin in some lines, by a demoralizing iron market, an abundant grain crop came to the rescue and brought with it freight rates that are beyond the highest expectations, and the reaction on account of short supplies of ore promises another profitable season in 1892. Shipbuilders, terminal companies and every branch of the trade will profit accordingly.

THERE is storage capacity at the head of Lake Superior for 20,000,000 bushels of grain, Duluth elevators being capable of caring for 11,500,000 bushels, while Superior has room for 8,500,000 bushels. These elevators as well as the big houses in Minneapolis and St. Paul will undoubtedly be filled during the coming winter, after 20,000,000 bushels, or more, of the big northwestern wheat crop has been moved by lake this fall. The grain holding over till next spring will add materially to the lake business of 1892.

"EVERY man is entitled to his own opinion" said a prominent Cleveland ore dealer a few days ago, "but deliver me from the prophets in the iron market and the lake business after this season. The northwest and its resources are too much for them."

Reid's Work on the Pontiac.

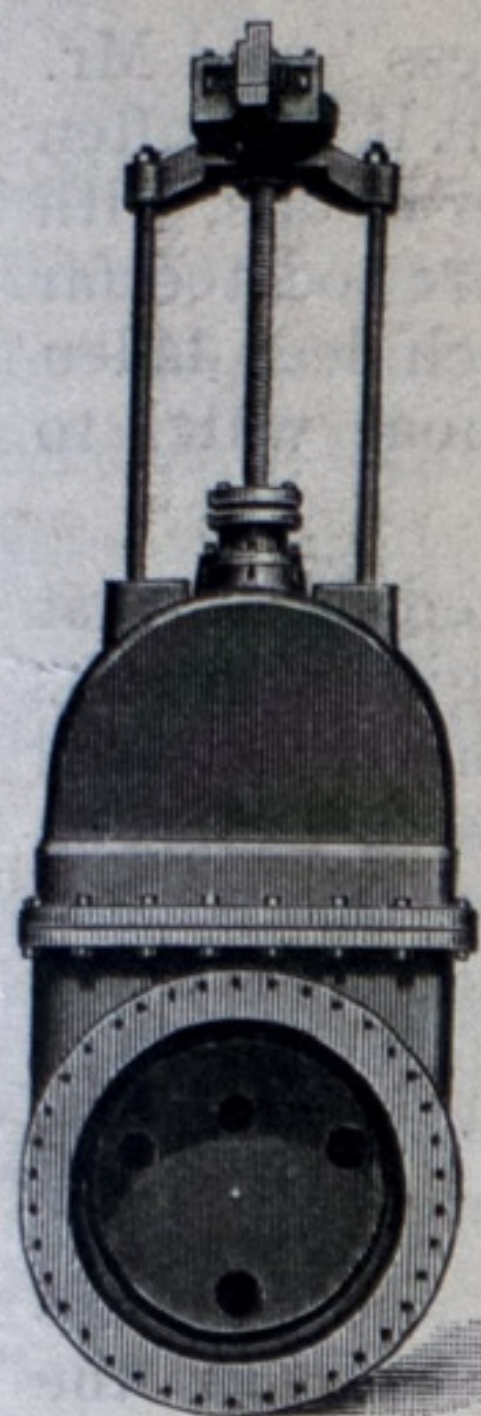
In the delivery last week of the steel steamer Pontiac in the Ship Owner's dry dock, Cleveland, Wrecker Reid did a good job of work, although it can hardly be said that he was not very fortunate in his operations. His action in bringing the wrecked boat down from the Sault river after relieving her of only a few hundred tons was criticised by representatives of the underwriters, and was the cause of some comment by outsiders, on the ground that he had everything to gain in not going to the expense of lightering the ore and little to lose in proportion, but he succeeded in landing the boat safely and is deserving of credit accordingly. Interest is now centered in the amount Capt. Reid will receive, as a result of his contract to deliver the Pontiac in Cleveland for 25 per cent. of the value of boat and cargo, as fixed by appraisal. Messrs. Coffinberry and Babcock have finished their survey but the figures are not given out. They are thought to be in the neighborhood of \$136,000, however, which would mean about \$32,000 gross for Reid's work. Although the cost of repairs on the Pontiac will not be as heavy as might be expected, it is probable that constructive loss was taken into consideration in the appraisal.

Vice President Bacon of the Minnesota Iron company, Robert Ramsey of the Frick Coke Company of Pittsburgh, and Robert Bently, iron manufacturer of Youngstown, have just returned from Puget sound. They speak encouragingly of the coal resources of Washington, but advance the opinion that coke made of the coal would be inferior to the Connelsville coke. There has been no development of iron properties upon which an opinion could be formed. It is thought that the visit of these gentlemen to Washington was in the interest of J. C. Morse and other capitalists interested in the Illinois Steel Company.

A. Sewell & Co. of Bath, Me., builders of the big wooden ships Shenandoah and Rappahannock, the former of 3,407 gross tons register and the latter 3,186 tons, have just launched another big vessel, the Susquehanna, costing about \$140,000 and capable of carrying 4,000 tons of freight. These big vessels have attracted a great deal of attention, on account of their large carrying capacity.

Shipyard Improvements.

Improvements now being made in different parts of the Detroit Dry Dock Company's big shipbuilding plant at Detroit indicate preparations for very active work, notwithstanding present differences between builders and lake vessel owners regarding prices on new tonnage. The company's new dock, which will be the finest in this part of the country, is expected to be ready for business in about three weeks, and steel shear legs of 100 tons capacity are also being put in place. The accompanying engraving shows one of the 30-inch valves for the steel gate of the big dock. The steel caisson gate is 12 feet wide on deck, 79 feet 5 inches long, 54 feet keel and 20 feet deep. The flooding capacity is expected to fill the dock in 20 minutes. The big gate contains enough steel to build a medium sized boat and is in form something like a ship. With these increased facilities the dry dock company will be in a position to give dispatch in repair work on any of the modern vessels in accord with the rush that characterizes other lines of work on the lakes.



Valve for Dry Dock Gate.

Speed of Ships.

The primary condition for high speed is fineness of form, so that the water at the bow of the vessel may be separated and thrown to one side, and brought to rest again at the stern and behind the vessel with the least possible disturbance, and the measure of efficiency of form for the maximum speed intended is inversely at the height of the waves of disturbance. A ship that has been designed to attain a speed of fifteen knots will, when moving at twelve knots, show a very slight disturbance indeed, and in one designed for eighteen knots, when moving at this lower speed, it will be scarcely observable; but however fine the lines of a ship may be, she must at every speed produce some disturbance, although it may be very slight, as the water displaced by her must be raised above the normal level, and replaced at the normal level; hence, at or near the bow of a ship there is always the crest of a wave, and at or near the stern the hollow of one. When a vessel is going at its maximum speed and is properly designed for that speed, the waves should not be very high, nor should it extend beyond the immediate neighborhood of the bow; likewise the wave of replacement should be the same at or near the stern of a ship, and the wake, or disturbance of the water left behind in the track of the ship should narrow.—A. E. Seaton, Naval Architect.

Ring Boiler Plates.

"The weakest part of a boiler," says the Marine Engineer, London, "is that where the plates are joined and riveted, and whatever the thickness or quality of plate, the joint between one plate and another is the test of its strength." Mr. John Windle of Barrow-in-Furness took out a patent for a mill to produce these plates, and a plant will soon be erected to manufacture ring boiler plates or shells. It is proposed to make the ring plates from 12 to 16 feet diameter and 5 feet wide. The rings will have flanged ends and can easily be turned so as to make accurate fittings. It is claimed that boilers made from the new plates will stand 250 to 300 pounds pressure.

Notice to Mariners.

The Canadian government gives notice that a pole light on the government breakwater at Wiarton, at the head of Colpoys bay, Georgian bay, was put in operation on the 4th inst. The light is shown from a lens lantern hoisted to the top of a pole 15 feet high, which has a white shed at its base. It stands on the breakwater, near its outer end. The light is fixed red, elevated 19 feet above the level of the water, and should be visible 6 miles from all points of approach by water.

In General.

Forty-eight hours from Buffalo to Sault Ste. Marie is a late record made by the steamer Emily P. Weed.

The River is the name of a marine publication recently launched in St. Louis and devoted to Western river interests. Abbott Veatch is the editor and business manager.

Through the Trout wheel just put on the steamer Armour, belonging to R. P. Fitzgerald & Co. of Milwaukee, the boat not only makes better time but vibration has been overcome.

Eward Dahlke, owner of the Cleveland tug American Eagle, has filed a libel for \$4,000 damages against the tug Alva B., also of Cleveland, as a result of a collision between the two boats off Cleveland harbor last spring, in which the American Eagle was sunk.

According to a research made by the Bath (Me.) Enterprise, the first vessel ever built in America was named Virginia. She was of only 30 tons burthen and was built in 1607 by a party of English colonists, who arrived at Popham on the peninsular of Labino.

In the list of bids for constructing the United States revenue cutter Calumet, that of the Manistee Iron Works Company was given as \$50,950, when it should have been \$43,950. This company has recently completed a large boiler shop that is thoroughly equipped for marine boiler work.

The wrecked barge Helena was sold to the Wolf & Davidson Shipyard Company of Milwaukee by the underwriters Tuesday for \$9,000. It cost \$7,700 to raise the Helena from the bottom of the Sault river, where she was sent by the steamship Mariska. Her cargo of ore was sold for 5 cents a ton more than it was insured for. The underwriters, who had \$26,000 on the barge, may save 10 per cent. in salvage.

It has been reported that Capt. Frank Hackett of Amherstburg has been engaged in trying to raise the schooner Fayette Brown, sunk some time ago in Lake Erie, below Colchester, in collision with one of the Northern Steamship Company's steamers. There is probably no truth in the story, as Mr. M. A. Bradley of Cleveland, who owns the Brown, has authorized no one to raise the boat, and there has been no settlement with the Northern Steamship Company.

That novel steamship, the Howard Cassard, being built by the Monumental Construction Company for the Arrow Steamship Co. of New York, is rapidly nearing completion. She is one mass of inventions. Some of the most novel things about her are the following: While her length over all is 222 feet, and her depth of hold 18 4-10 feet, her beam (moulded) is only 16 feet. Her hull alone, excepting the machinery, weighs 320,000 pounds. Each of the four blades of her propeller is placed in advance of the others, which arrangement enables each one of them to work in solid water. A number of old salts predict that this craft will roll over on her beam ends and stay there. That will be impossible, as her keel alone weighs 70,000 pounds.

Capt. Meade, in charge of the naval exhibit at the World's Columbian Exposition, has suggested to the department the advisability of having the naval academy represented by the presence on the lake front of the steel practice ship, for the building of which F. W. Wheeler & Co. of West Bay City were the lowest bidders, but which is being built on the coast on account of treaty relations with Great Britain regarding war vessels on the lakes. This practice boat will be ready for her first summer cruise in 1893, and Capt. Meade says that she can be taken up the St. Lawrence and Welland canals. The treaty prohibition clause is still in the way, but it is thought that a dispensation can be secured for the exhibition of the boat.

Engineers who have used for several seasons past the Keystone marine valve, made by the Erie Rubber Company of Erie, Pa., make very favorable reports of the high quality and lasting endurance of this rubber valve and the company has made big sales this season. The company's location is such that all lake ports can be reached in a few hours and orders for special sizes and shapes can be filled on very short notice.

THE DETROIT TRIBUNE (WEEKLY) AND THE MARINE REVIEW, ONE YEAR, \$2, THE PRICE OF ONE.

THREE DOLLARS FOR TWO—THE MARINE REVIEW AND DETROIT TRIBUNE (WEEKLY) ONE YEAR FOR \$2.

Smashing all Cargo Records.

As had been expected, the steamer E. C. Pope on going to Chicago for grain last week took on a cargo, Saturday, that is larger by 8,500 bushels than anything carried on the lakes. She loaded 125,990 bushels of corn on a draft of 15 feet 6 inches forward and 15 feet 10 inches aft.

The Pope has now broken the carrying record on every route on which she has been engaged. She carried between May 23 and September 6 (106 days) 5,466 tons of coal and 30,102 gross tons of ore, running 17,688 miles. Following is a statement of the boat's performance on her last trip for iron ore to Lake Superior, her draft when loaded being limited, on account of the Sault canal. The data was prepared by experts from the Detroit Dry Dock Company:

PERFORMANCE OF STEAMER E. C. POPE, 1891.

Length—Keel.....	314 ft.	
" Over all.....	334 ft. 6 in.	
Breadth.....	42 ft.	
Depth.....	24 ft.	
Engine—Cylinders.....	22 in., 35 in., 56 in.	
" Stroke.....	44 in.	
Two Boilers—Diameter.....	14 ft. 2 in.	
" Length.....	11 ft. 6 in.	
Date of Run.....	Sept. 2, loaded.	Aug. 31, water ballast.
Cargo, iron ore, Lake Superior.....	3,109 net tons.	
Mean Draft.....	14 ft. 6 1/4 in.	7 ft. 0 3/4 in.
Displacement (net tons).....	4,710	2,100*
Distance (miles).....	314	308
Time Running.....	22 hours 59 min.	19 hours 48 min.
Miles per Hour.....	13.66	15.55
Boiler Pressure (lbs.).....	152.3	154.7
Revolutions per Minute.....	87	90.9
Indicated Horse Power.....	1,357.86	1,490.78
Coal per Hour (lbs.).....	2,632	2,886

Forced for short distance, 16.4 miles per hour; engine making 101 revolutions.

* Includes water ballast.

The steamer Western Reserve, which had held the grain record up to last week, has also just delivered a big load at Buffalo. She took 112,317 bushels of wheat from Chicago. This is a heavier load than her corn cargo of 117,540 bushels delivered a short time ago. The Minnesota Steamship Company's steamer Manola carried 104,000 bushels of corn and the John T. Moore 100,000 bushels.

Around the Lakes.

Floating obstructions in the Chicago river broke a portion of every blade on the steamer Chemung's sectional wheel and yet she made fair time to Buffalo.

The schooner C. A. King was sold by the United States marshal at Buffalo to Johanna Herbold, of Chicago, for \$2,900. Half a dozen libels had been filed against her.

On her last trip to Buffalo the steamer Craig towed the schooner Crosthwaite from Duluth in 4 days and 15 hours, being only 28 hours on Lake Erie with a head wind part of the time.

The Buffalo Courier says the steel steamer E. P. Weed, Capt. Campau, made her last round trip to Duluth in 7 days and 3 hours, and lost about 4 hours at the Sault. There are few freight boats on the lakes that can run with the Weed.

The Goodrich Transportation company's steamer City of Ludington will be fitted with a complete electric light plant with a search light on the bridge for use in making her way through the ice in winter. She will be considerably repaired and altered.

At the office of the American Steel Barge Company, West Superior, a great collection has been made of newspaper clippings from all parts of the world concerning the whalebacks. They are being sorted and will form a curiosity when arranged for reference.

James Ash of Buffalo, has bought from the Anchor Line the tug Erie for \$10,000. She was built by the Union Drydock Company of Buffalo, in 1875, was rebuilt in 1877, measurers 28 tons, classes A 2, and has a register valuation of \$7,000. The Erie had been used by the Anchor Line for assisting their own boats at Erie. She will remain at that port.

Thomas S. Mott, who died at Oswego on the 13th inst., was 65 years old. In the days of Oswego's commercial prosperity he built these vessels: Bermuda, Bahama, Thomas S. Mott,

Henry Fitzhugh, J. E. Gilmore, Norwegian, Jamaica, Nevada, Florida, John T. Mott, Havana, Nassau, Atlanta and Pulaski. He owned also the J. J. Holley, S. H. Lathrop, Ostrich and James Navagh.

"We are getting our share of the fueling business" said Mr. Stanley B. Smith of Detroit, a few days ago, "but it has often occurred to me that we would get more of it if our docks, with the pockets filled and always ready for boats, were located far enough above the shoal water at Grosse point to catch deep laden vessels bound up and far enough below the shoal water to accommodate the big fellows bound down."

A careful record kept on board the Pewaukee shows that since the Manistee Iron Works compounded her engine there has been a wonderful saving in the fuel bills. It formerly required 28 to 30 tons of coal to make the round trip between Sturgeon Bay and Chicago, against 24 cords of slabs so far this season. The coal costs on an average of \$3.75 per ton, making upward of \$100, while the slabs are \$1.25 a cord, making a difference of \$70 in the fuel bill each trip. Aside from this the steamer makes better time than heretofore.—Sturgeon Bay Advocate.

The stage of water in the Sault canal as an average has been lower this season than ever before. This year, in the spring, the water started at 14 feet on the miter sill, and gradually increased to 14 feet 5 inches in the month of August. The corresponding figures for 1890 were 14 feet 2 inches in the spring and 15 feet 3 inches in August. This is to say that the month of August this year has seen water 11 inches lower than last year on an average, while the tonnage through the canal has been the largest in its history. It is also true that at times in 1890 the water reached to 15 feet 5 inches, while in 1891 it has only reached the mark of 14 feet 8 inches. These last figures were entirely due to the high prevailing winds down Lake Superior.

Cleveland Matters.

The big steamer C. B. Lockwood was in the Ship Owners' dry dock Sunday. The Lockwood is a very substantial wooden boat, and notwithstanding her great breadth of beam, 45 feet, she can probably outrun any wooden boat on the lakes.

The Hughes Steam Pump Company have established a downtown office at 13 South Water st.; Telephone 685. There is a storeroom in connection with the office and a full line of pumps and repairs for same will be carried. The new office is in charge of A. E. Brown.

In coming from Port Huron to Cleveland Monday the steel steamers J. H. Wade and Frontenac, keeping very close together, made the run, 165 miles, in 16 hours. The time from Detroit, 105 miles, was 9 hours and 50 minutes. There was evidently no rivalry between the captains, as either boat is capable of making much better time.

Capt. McKay is hearing from different parts of the lakes with reference to the list of aids to navigation for which appropriations will be sought from the next congress. Masters engaged in the lumber and coal trade on Green Bay want a light-ship on Peshigo shoal. Capt. Wm. Nicholson of the steamer Boscobel says that five vessels have stranded on this shoal so far during the present season.

Through the lease of the Pennsylvania Company's ore docks at Erie, in which the Carnegies and Pickands, Mather & Co. of Cleveland are jointly interested, the latter firm now operates docks in Cleveland, Ashtabula, Erie and Buffalo. Their ores are mainly from the mines of the Minnesota and Chandler companies of the Vermillion range in Minnesota. The Erie docks have a storage capacity of 500,000 to 600,000 tons.

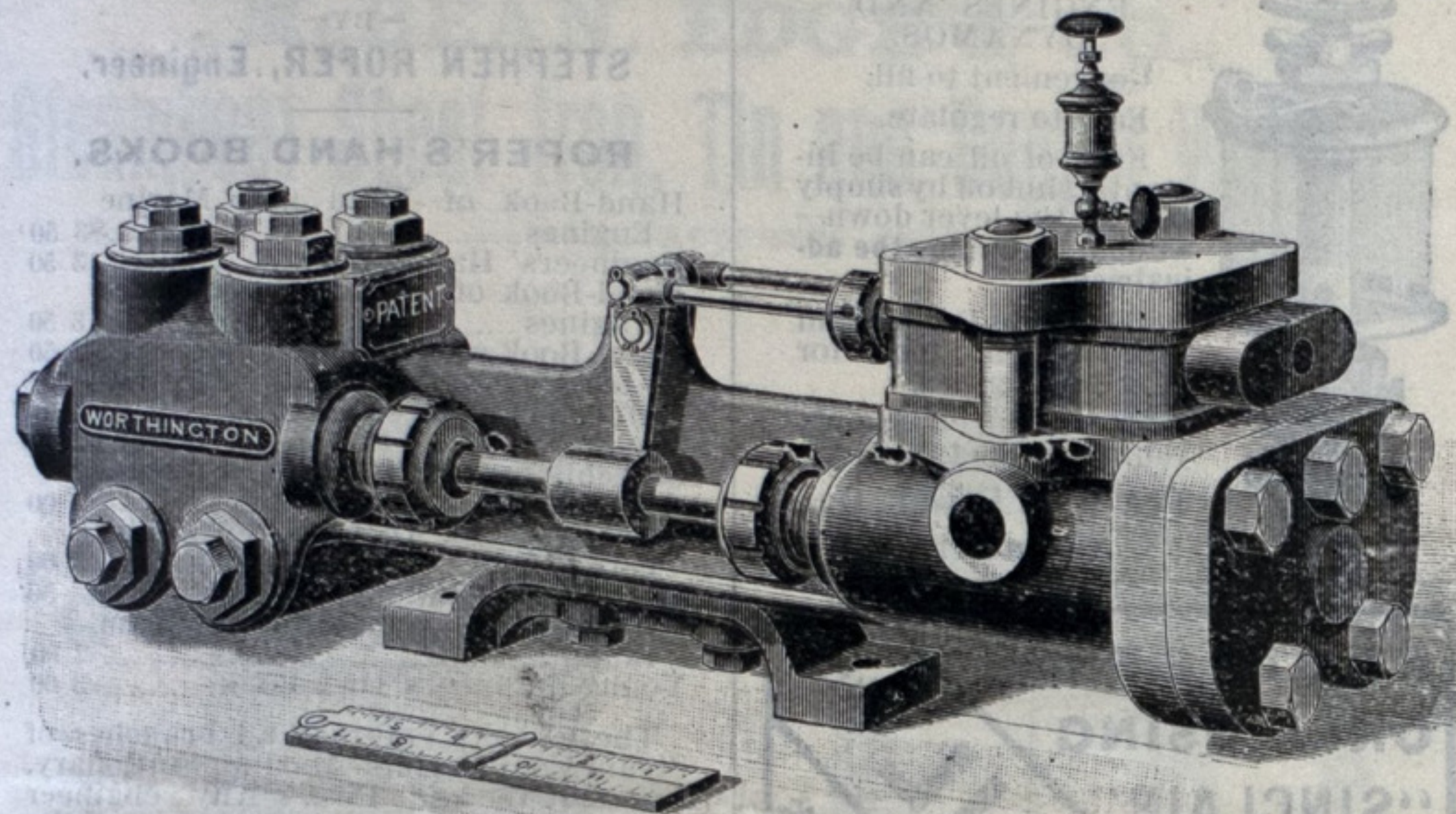
Capt. Reid's tug Seagull with the greater portion of the wrecking apparatus used in raising the Pontiac from the Sault river was, upon the arrival of the Pontiac in Cleveland, dispatched to the schooner Golden Fleece, stranded near Dunkirk, Lake Erie, last fall. An effort had been made to release the Golden Fleece before Reid began work on the Pontiac, and with better facilities the schooner will probably be released shortly.

The steam-yacht Wadena has been supplied with a full outfit of Coston night signals. This is the first lake yacht to carry these signals. The Saginaw Steel Steamship Company owning the Mackinaw and Keweenaw, built on the lakes, have ordered a distinguishing Coston signal consisting of a green light followed by a red and a white star thrown 50 feet.

Light Weight and Compact Pump.

A Worthington pump, designed at the request of the engineer in chief of the United States Navy, to be used for feeding boilers on the steam launches of the naval vessels, is shown in the accompanying engraving. These pumps are now used exclusively by the navy department, and are also largely used by builders of steam launches and yachts where compactness and light weight are necessary features. The weight, 60 pounds, is exceedingly light, when it is considered that the pump is sufficiently strong to work against 250 pounds per square inch.

The arrangement and design of water valves are such as to add novel and valuable features to the pump. The water cylinder linings and pistons are entirely of composition, and when desired, composition piston rods will be furnished without additional cost. The valve motion, while retaining all the valuable characteristics embodied in the well known Worthington arrangement, possesses new and important patented features by means of which simplicity and efficiency are obtained to an unusual extent. There are no rock-shafts and the entire valve motion



consists of but six separate pieces: the most important parts being lubricated by the steam and perfectly protected from injury or derangement from outside causes. The dimensions are as follows: Diameter of steam piston, 2 inches; diameter of water piston, $1\frac{1}{8}$ inch; length of stroke, $2\frac{3}{4}$ inches. Capacity, according to speed, 2 to 6 gallons per minute, equivalent in capacity to any single-cylinder pump having $1\frac{5}{8}$ inch water pistons. For short lengths of pipe the connections are: Steam pipe, $\frac{3}{8}$ inch; exhaust, $\frac{1}{2}$ inch; suction, 1 inch; discharge, $\frac{3}{4}$ inch. These diameters must be increased as the length of pipe increases. Space occupied, $19\frac{1}{2} \times 6\frac{1}{2}$ inches, and 8 inches high. Shipping weight 60 pounds.

This pump can also be fitted with hand lever attachments for filling boilers after blowing off, and for washing decks, etc. It can be run in any position, vertical or horizontal.

Treasury Decisions.

PIPE OR COIL BOILERS.

Among the July decisions of the treasury department is the following circular order from the office of the steamboat inspection service, which was briefly referred to in the REVIEW a short time ago, and which is now printed in full on account of the interest shown in this class of boilers on the lakes:

To Supervising and Local Inspectors of Steam Vessels, Inspection Service, and others: The supervising inspector of the ninth district has reported to this office the rupture of a steam-drum, 20 inches in diameter, attached to a pipe boiler which had been duly approved by the board of supervising inspectors, under the provisions of Sec. 4429 revised statutes; such rupture having occurred, as reported, because the material of which it was constructed (iron) was not "rolled to form of shell with the grain of material," as required by Sec. 7, Rule 2. A test of the material since the rupture shows ample tensile strength for the steam pressure allowed, whether with or across the grain, though there is a difference of about 9,000 pounds between the two; whereas the reduction of area with the grain shows 24.32 per cent.; while across the grain, to which in this case the material was subjected to the greatest tensile strain, the reduction of area was but 5.94 per cent., or about 9 per cent. less than permitted by the rules and regulations, sec. 6, Rule 1.

In order to prevent such accidents in the future, it is deemed advisable that hereafter a sample piece for testing in the usual manner shall be required, and tested under the rules and regulations, from all steam drums of boilers applying for first inspection, which are over 15 inches diameter of drum. If drums are made of lap-welded piping, such sample pieces shall be obtained by cutting a strip from one end of the pipe, 2 inches wide, so that the test will be crosswise the roll of the material. If drums are made of riveted iron plate, they must be rolled to form, as required by the rule already referred to. The inspectors will obtain the usual manufacturer's oath before testing samples, to be filed with their records for reference.

Supervising inspectors, in transmitting their approval to the treasury department, of pipe or coil boilers using petroleum as fuel, with steam-drums over 15 inches in diameter, will send a copy of the tests of the material of which made, for file with such approval. Local inspectors are directed to require on the name-plates of all new coil or pipe boilers or steam-generators not constructed of riveted iron or steel plates the shop-number of the boiler, in addition to the requirements of Sec. 20 of Rule 2, for the purpose of identification. JAS. A. DUMONT.

Supervising Inspector-General.

Owners of Ohio and Mississippi river steamers have been trying for some time past to make captains and their clerks and other officers who are said to be fitted, after a few years of experience, to take charge of their boats, but the treasury department has again ruled against them in an opinion, under date of July 17, from Attorney General Miller. He confirms the right of the board of supervising inspectors to make rules and regulations concerning the qualifications of persons for admittance as licensed officers of steam vessels. Sec. 14 Rule 5 of the General Rules and Regulations provides that applicants for the certificate of a master, in the district in question, must have been licensed and served one year as first class pilot or chief mate on lake, bay or river steamer.

In the case of a foreign vessel that had been wrecked in American waters, sunk and abandoned for two years, the department allowed free entry of wrecked goods. In a letter to the collector of customs, Port Townsend, Wash., in regarding the wrecked goods, Assistant Secretary O. L. Spaulding says: "It being understood that the vessel has been for two years sunk in the waters of the United States and abandoned by her owners, you are hereby authorized to allow the landing, without entry and free of duty, of any goods which may be recovered at Port Angeles, in your district, which is the nearest port to the wreck."

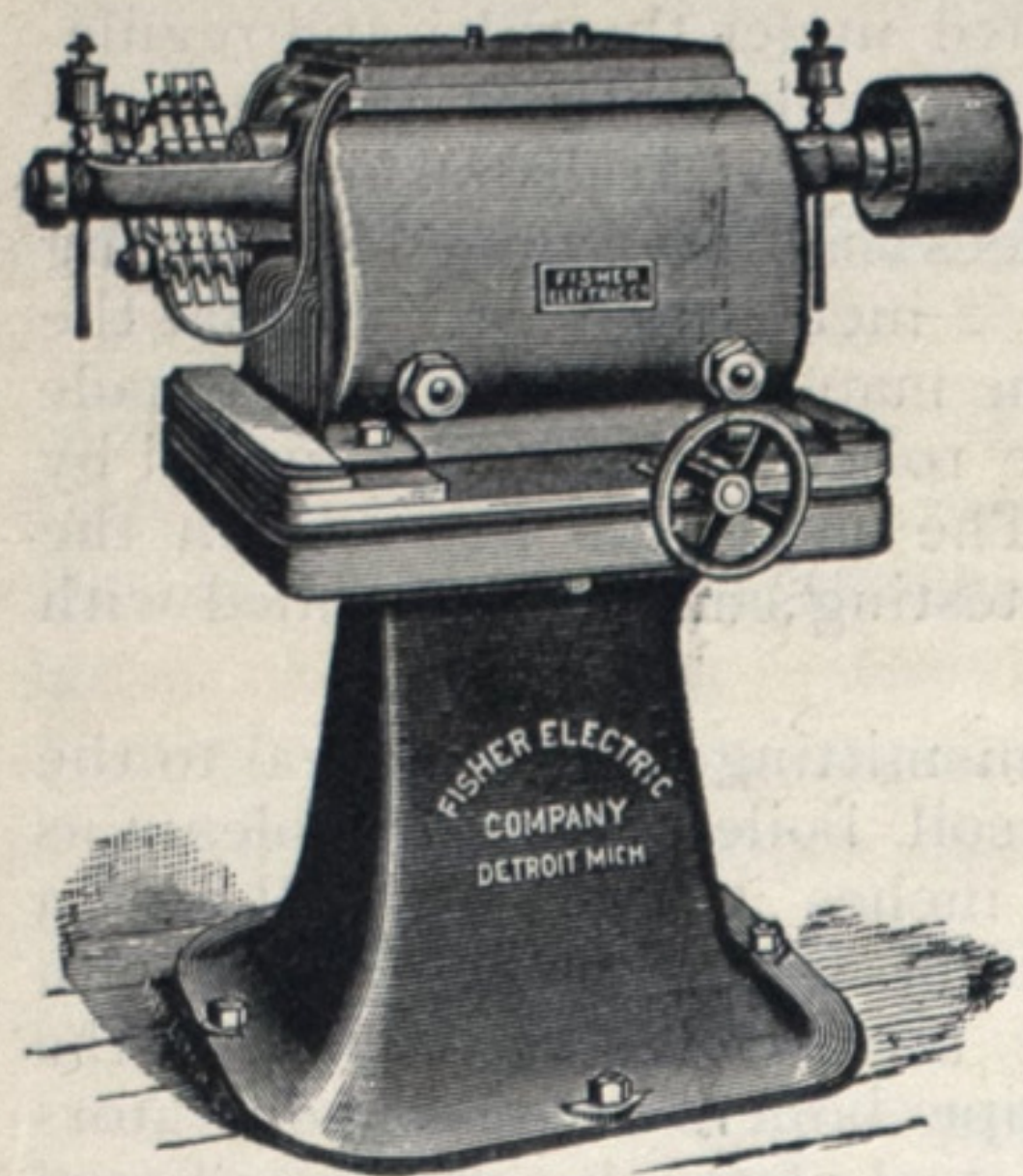
THE Erie Railway has placed a new and elegant line of sleeping and parlor cars on its trains between Cleveland and Pittsburgh. The night train, 11:00 p. m., will carry straight sleeper of latest design and provided with every comfort and convenience, while the afternoon train, 2:55 p. m., will have drawing room car, perfect in every appointment. These cars have been especially prepared for the service and are excelled by none. Reserve space at 141 Superior street, Weddell House block.

\$6.00—Chicago excursion, October 3, via the Nickel Plate. Under the auspices of Erie lodge, No. 27, I. O. O. F. of Cleveland, O. Trains leave Cleveland 6:30 a. m. and 9:30 p. m. Tickets good seven days. The Chicago Exposition opens Sept. 16, and closes October 26. The Grant monument will be unveiled Tuesday, October 6. The meeting of the Society of the Army of the Tennessee takes place October 7 to 9. Do not fail to see the World's Fair buildings now under construction.

UNITED STATES ENGINEER OFFICE, 34 West Congress street, Detroit, Mich., September 19, 1891. Sealed proposals, in triplicate, will be received at this office until 2 o'clock p. m., October 19, 1891, and then opened: For furnishing ten gate anchorages for the 800 feet lock at St. Mary's Falls Canal, Michigan. Preference will be given to materials of domestic production or manufacture, conditions of quality and price (import duties included) being equal. Attention is invited to Acts of Congress, approved February 26, 1885, and February 23, 1887, vol. 23, page 332, and vol. 24, page 414, Statutes at Large. The government reserves the right to reject any or all proposals; also, to waive any informalities. For further information apply at this office. O. M. POE, Colonel, Corps of Engineers, Bvt. Brig. General, U. S. A.

PROPOSALS FOR OIL.—Office of Light-House Inspector, Third district, Tompkinsville, N. Y., September 18, 1891. (Postoffice box 2128, New York City.) Sealed proposals will be received at this office until 12 o'clock m. of Thursday, the 1st day of October, 1891, for furnishing Mineral Oil and Lard Oil of the quality required for the United States Light-House Service. Specifications, forms of proposal, and other information may be obtained on application to this office. The right is reserved to reject any or all bids, and to waive any defects. HENRY F. PICKING, Captain U. S. N., Inspector.

SEE CAPT. PECK'S LETTER Regarding Incandescent Lighting Plant on the Steamer S. R. KIRBY.



NORTHWESTERN TRANSPORTATION CO.

FISHER ELECTRIC CO.,
Detroit, Mich.,

DETROIT, MICH., Oct. 7, 1890.

GENTLEMEN :—Replying to your inquiry regarding the operation of the 200 Light Incandescent Plant placed on the Steamer S. R. Kirby, we wish to say that the plant has operated during the season without an interruption and has not cost us one cent. No Lamps have been broken, and we would not be without it. Very truly yours,

E. M. PECK, President.

FISHER ELECTRIC COMPANY, 183, 185 & 187 Larned St., West, DETROIT, MICH

VESSEL AND MACHINERY EXCHANGE.

Space under this heading may be used gratis by our advertisers or subscribers to call attention to vessels or any craft, machinery, new or second hand, that they may have for sale. Those wanting machinery of any kind, or wishing to purchase vessels, are invited to take advantage of the same offer. Each item will be limited to three lines. Letters concerning same must mention number attached to item and be addressed MARINE REVIEW, 510 Perry-Payne Building, Cleveland, O.

65—For Sale Cheap—Two 10 x 10 Marine Engines with two 4 feet 4 inch wheels; good shafting, heater, boiler, steam pump and connections; or will exchange for small yacht or real estate.

66—Steambarge that will carry 200 tons wanted for balance of season, or longer.

67—WANTED—To purchase a tug suitable for fishing purposes 60 to 80 feet long, engine 10 to 12 square; must have good deck room and be in good condition.

68—WANTED—Engineer to purchase small interest in a dredge.

69—WANTED—700-ton steamer with large per cent. of fullness.

70—Dredge hull wanted, or parties wanted to buy machinery for same.

71—60-foot sloop yacht with roomy cabin containing two state rooms.

72—Good second-hand 60-foot fish tug wanted.

73—Triple expansion surface condensing engine, 14, 22, 36 and 24 inches for sale.

74—FOR SALE—Steam launch 28 feet long and 5 feet beam with compound engine and coil boiler.

75—Dredging plant and contract for sale.

1867. PERFECT SATISFACTION GUARANTEED. 1891.

A. G. HARBAUGH & CO.,

34 & 36 River Street, CLEVELAND, O.

Manufacturers of Strictly Pure and Acidless Lard Oils, specially adapted for Steamboat use.

Will furnish Brand free for Ship Chandlers or other dealers who desire their name and address on packages.

RARE CHANCE for capitalists to invest eight or ten thousand dollars in boats that have recently been patented and will pay from thirty to fifty per cent. per annum. Can be used in numbers of places in the United States. For further particulars address MARINE REVIEW.

LOCUST SHIP TREENAILS, . . . Manufactured of Best Selected North Carolina Stock.

CORRESPONDENCE WITH SHIP BUILDERS SOLICITED. RIFTED AND TURNED ANY SIZES AND LENGTHS.

Nearly all Maine Shipyards furnished from our Factory. **BLUE RIDGE LUMBER CO.,** Dillsboro, North Carolina.

ERIE OIL COMPANY,

HIGH FLASH.

ERIE, PA.,

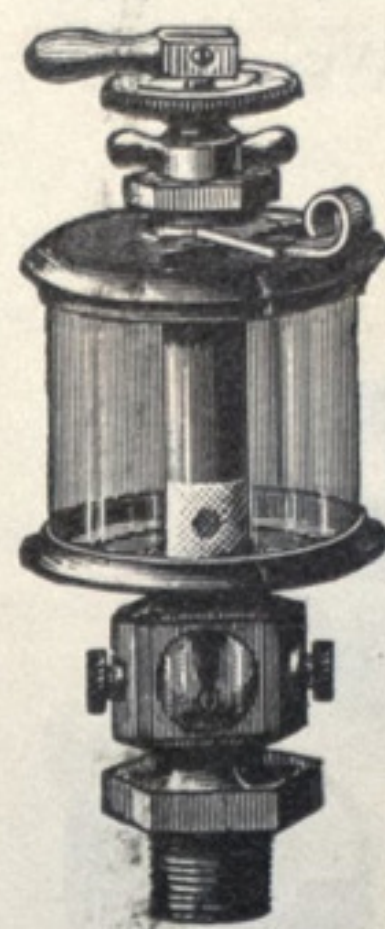
HIGH VISCOSITY.

MANUFACTURERS OF THE

Monarch Valve Cylinder and Engineers Valve Oils,

THE MOST PERFECT CYLINDER OILS FOR MARINE USE.
EVERY BARREL GUARANTEED.

Powell's Signal Oilers.



INCOMPARABLE FOR ENGINES AND DYNAMOS.

Convenient to fill.

Easy to regulate.

Flow of oil can be instantly shut off by simply moving the lever down—without disturbing the adjustment.

Also made Double and Triple Sight feed for Marine Engines.

Your dealer can supply you. Manufactured by

The Wm. Powell Co.,
CINCINNATI, O.

ENGINEERS
ONCE USING
"SINCLAIR"
BRAND
KEEP
TO
IT
PURE LARD OIL ONLY
SEND FOR FREE SAMPLE TO THE MANUFACTURERS, WHO GUARANTEE ITS ABSOLUTE PURITY.
T. M. SINCLAIR & CO.,
CEDAR RAPIDS, IOWA.

POPULAR and INSTRUCTIVE BOOKS

For Engineers and Firemen,

—BY—

STEPHEN ROPER, Engineer.

ROPER'S HAND BOOKS.

Hand-Book of Land and Marine Engines.....\$3 50
Engineers' Handy Book.....3 50
Hand-Book of Modern Steam Fire Engines.....3 50
Hand-Book of the Locomotive.....2 50
Instructions and Suggestions for Engineers and Firemen.....2 00
Use and Abuse of the Steam Boiler.....2 00
Catechism of High Pressure Steam Engines.....2 00
Questions and Answers for Engineers.....3 00
Simple Process.....50
Care and Management of the Steam Boiler.....2 00
Young Engineers' Own Book.....3 00

These books embrace all branches of Steam Engineering—Marine, Stationary, Locomotive and Fire. Any engineer who wishes to be well informed in all the duties of his calling should provide himself with a full set. They are the only books of the kind ever published in this country, and they are so plain that any engineer or fireman that can read, can easily understand them.

Any of the above books will be sent to any part of the United States or Canada on receipt of list price.

Send money in Registered Letter, P. O. Order or Postal Note.

EDWARD MEEKS, Publisher,

No. 1012 Walnut St., PHILADELPHIA, PA

WRECKING AND TOWING COMPANIES.

I. H. OWEN, PRESIDENT, F. H. VAN CLEVE, SEC. CAPT. GEO. BARTLEY, SUPT.
Chicago. Escanaba. Escanaba.

ESCANABA TOWING & WRECKING CO., Escanaba, Mich.

Tugs, Lighters, Steam Pumps, Hawsers, Hydraulic Jacks and Diving Appliances always ready.

TUG MONARCH, Engine Compound, Cylinder 16 and 30 inches diameter, 30 inch. Stroke, Steam Pressure Allowed, 125 pounds.

TUG DELTA, Cylinder 20 by 22, Steam Pressure Allowed, 105 pounds.

TUG OWEN, Cylinder 20 by 20, Steam Pressure Allowed, 104 pounds.

CENTRIFUGAL PUMPS, Seven and Fourteen Inch Suction.

V.O.T. LINE OF TUGS.

ALVA B.

H. L. CHAMBERLIN.

W. D. CUSHING.

JOE HARRIS.

TOM MAYTHAM.

C. G. CURTISS.

W. A. COLLIER, Manager.

Office, Main Street Bridge,
Telephone 409.

CLEVELAND.

Steam Pumps, Hawsers, Lighters, etc., furnished on short notice.

Duluth, South Shore & Atlantic Railway,

OVER 100 MILES SHORTER than any other line between And Principal New England and Canadian Points and BOSTON, MONTREAL, the great Northwest.

THE ONLY LINE TO ST. PAUL AND MINNEAPOLIS, VIA DULUTH.

The New Short Line from principal points in Michigan to DULUTH, PACIFIC COAST and intermediate sections. RATES ALWAYS THE LOWEST.

New and elegant Wagon Vestibule Buffet Sleeping Cars on through trains. For time tables, tickets and general information call on nearest ticket agent or write to

C. P. FLATLEY, Genl. Western Agt., 291 Jackson Street, ST. PAUL, MINN.

V. DEARING, District Pass. Agt., 202 Main Street, JACKSON, MICH.

W. F. FITCH, Genl. Manager,

I. H. LARKE, Commercial Agt., 327 Superior St., DULUTH.

C. B. HIBBARD, Genl. Pass. & Tkt. Agent, MARQUETTE, MICH.

S. B. GRIMMOND,
FIRST CLASS TUGS FOR WRECKING, RAFT TOWING, ETC.

OWNER OF TUGS

WINSLOW
LEVIATHAN
SWEEPSTAKES
CRUSADER, M. SWAIN
CHAMPION, JOHN DWEN
WM. A. MOORE &
OSWEGO



EIGHTEEN
STEAM PUMPS,
ROTARY WORTHINGTON &
CENTRIFUGAL HYDRAULIC JACKS,
SUB MARINE DIVERS, HAWSERS,
LIGHTERS & C
WAREHOUSE & OFFICE ON
DOCK, FOOT OF
FIRST ST.

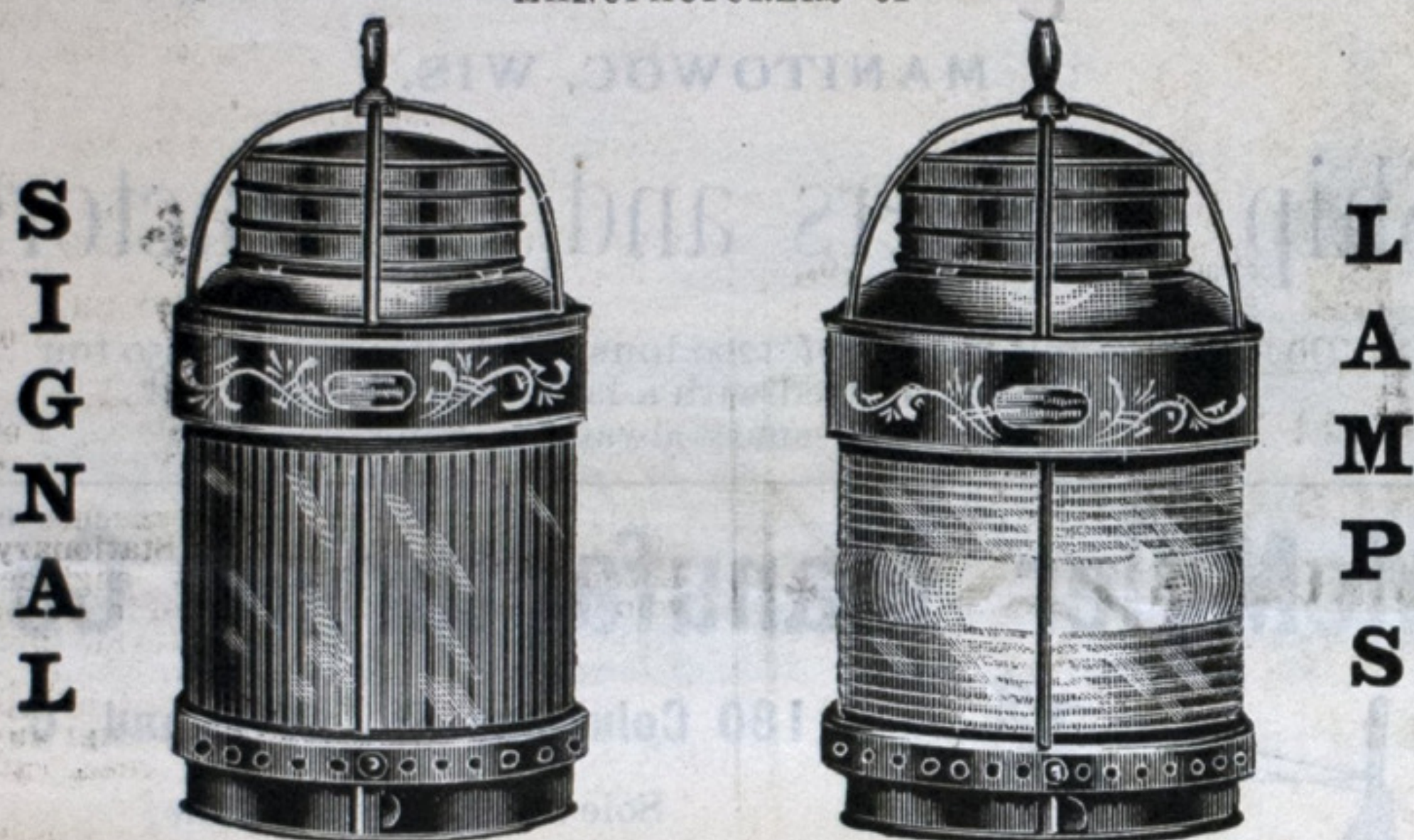
OFFICE OPEN DAY & NIGHT
SATISFACTION GUARANTEED.

DETROIT, MICH. WRECKING TUG LEVIATHAN STATIONED AT CHEBOYGAN
WITH PLENTY OF WRECKING MATERIAL ON BOARD AND IN WAREHOUSE.

BRANCH OFFICES AT PORT HURON, & CHEBOYGAN MICH.

McBEAN, EDGE & CO., Steamboat Sheet Iron, Tin and Copper Workers,

— MANUFACTURERS OF —



With patent lenses, fluted or corrugated, with corrugations inside or out.

STEEL RANGES for Steamboats and Hotels.

HEAD LIGHTS, ENGINEERS' SUPPLIES,

Anchor and Binnacle Lamps; Square, Triangle and Canalboat Head-Lights; Torches,
Coal Oil Lamps, Lanterns, Chimneys, Wicks, &c.

Telephone 803.

33 Main St., BUFFALO, N.Y.

TO LAKE CAPTAINS and VESSEL OWNERS.

GOVERNMENT LAKE CHARTS should be mounted on cloth back, and bound on the edges with tape, and in this way kept in better shape, made more durable, and handled without being torn. I have already mounted many Charts, giving entire satisfaction.

Reference,
Capt. Geo. P. McKay.

WM. A. HOWE,
Map and Show Card Mounter.
568 Ontario Street.

SUBSCRIPTION TO THE MARINE REVIEW IS \$2 PER YEAR, BUT IF YOU SUBSCRIBE DURING THE NEXT 60 DAYS YOU WILL RECEIVE THE DETROIT TRIBUNE (WEEKLY) ONE YEAR, FREE OF CHARGE.

TRAVELERS' REGISTER.

Standard time, given here, is 33 minutes slower than City time.

THE NEW YORK, CHICAGO & ST. LOUIS R. R.

	Arrive East.	Depart East.
Buffalo Passenger	10 40 AM	10 45 AM
Chicago Passenger	9 20 PM	.....
Local Freight	4 00 PM	.....
WESTWARD.		
Chicago Passenger .....	.....	6 30 AM
Fostoria Passenger	6 40 PM	7 00 PM
Local Freight	3 50 PM	6 00 AM
Lorain Accommodation, Departs .....	.....	5 10 PM
Dover Accommodation, Departs	1 30 PM and	5 10 PM
All trains daily except Sunday.		

ERIE RAILWAY.

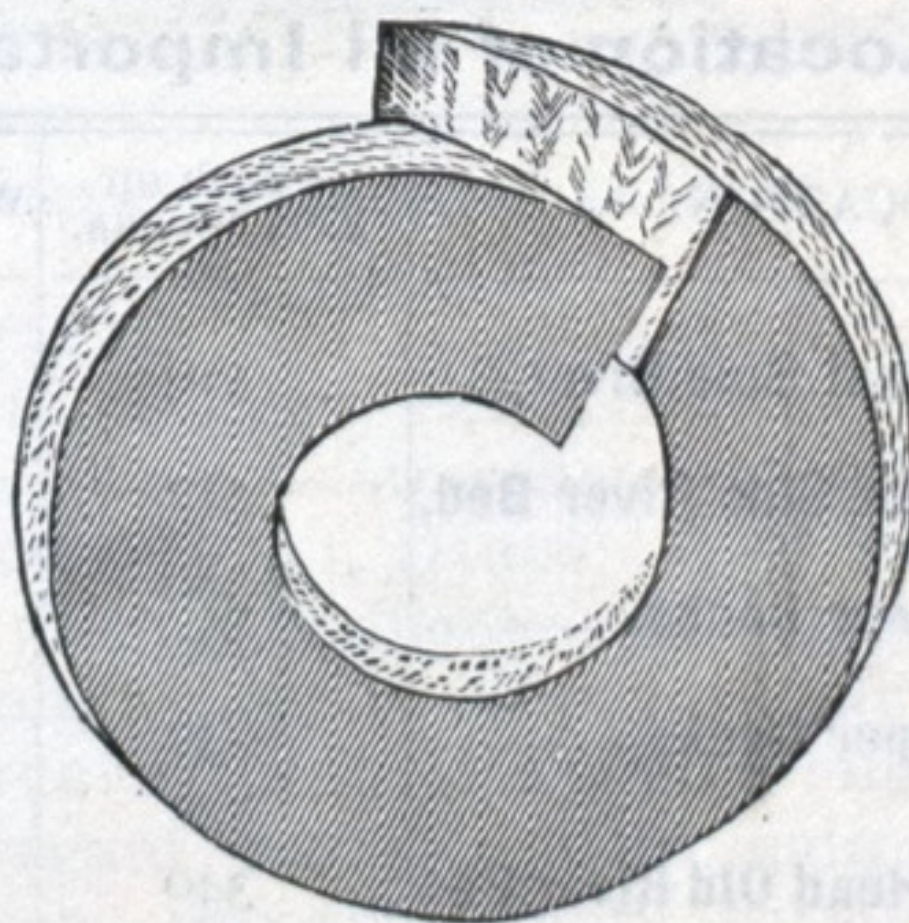
	Arrive.	Depart.
Youngstown Accommodation	*7 15 AM	†6 30 AM
New York and Pittsburgh Express	†5 15 AM	*8 10 AM
Pittsburg Accommodation	*12 30 PM	*11 25 AM
New York & Pittsburgh Limited	*9 55 AM	*2 55 PM
Mantua Accommodation	*7 20 PM	*4 20 PM
Youngstown Express	†9 10 PM	†6 00 PM
New York & Pittsburgh Express	*6 50 PM	*11 00 PM
* Daily. † Daily except Sunday.		

The short and direct route to Pittsburg, Washington and Baltimore. Only 4½ hours to Pittsburg; four trains daily.

For tickets, sleeping car space and further information address City Passenger Agent, 141 Superior St., (Weddell House block,) or Central Passenger Station, South Water Street.

A. M. TUCKER, Gen'l Manager, G. E. FOUTS, C. P. and T. A.,
Cleveland, O. Cleveland, O.
W. C. RINEARSON, Gen. Pass. Agt., New York.

GOULD'S STEAM AND WATER PACKING.



Pat'd June 1, 1880—The Original Ring Packing.
For Piston Rods, Valve Stem of Steam Engines,
Steam Pumps, and especially adapted for Marine
Engines and Electric Light Plants.

In ordering, give exact diameter of Stuffing
Box and Piston Rod or Valve Stem.

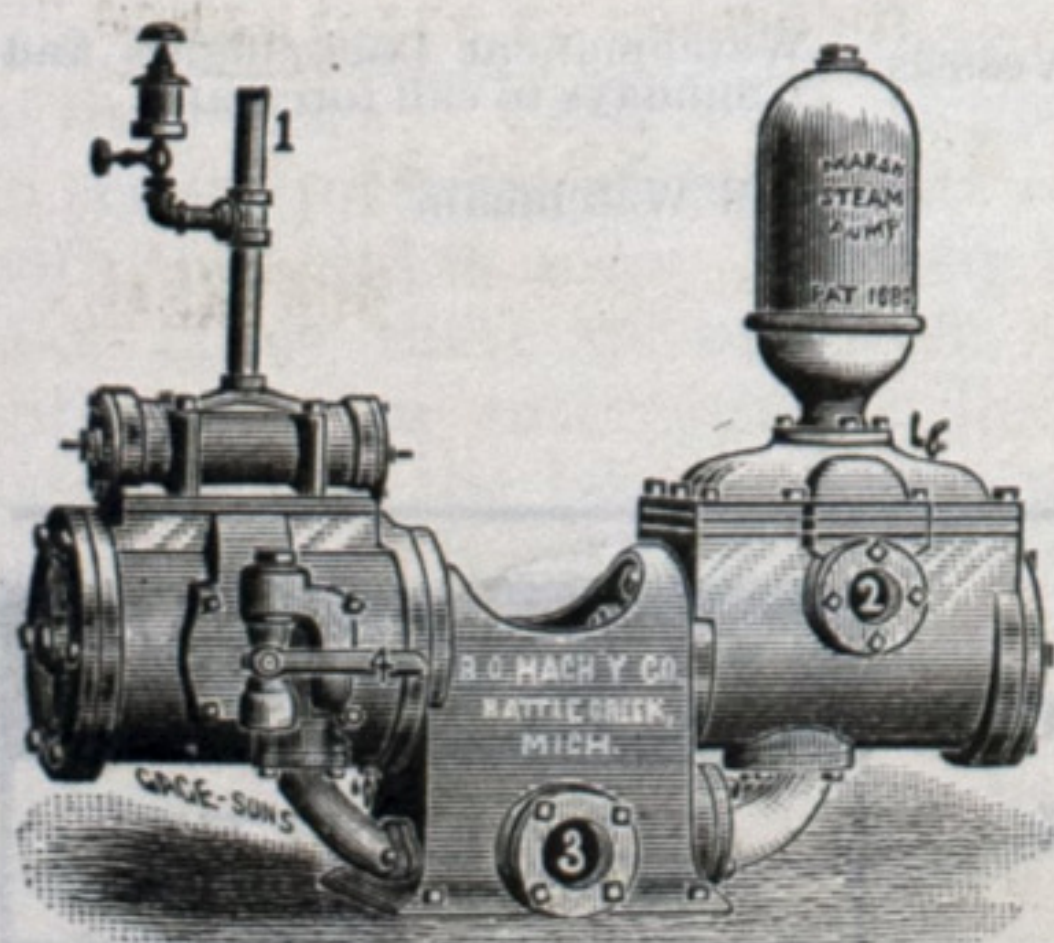
Self-Lubricating, Steam and Water Tight.

Less friction than any other known Packing.
Never grows hard if directions are followed.
Does not corrode the rod. Every Package Fully
Warranted.

N.B.—This packing will be sent to any address,
and, if not satisfactory after a trial of 30 days,
can be returned at our expense. None genuine
without this trade-mark and date of patent,
stamped on wrapper. All similar Packages are
imitations, and calculated to deceive.

THE GOULD PACKING COMPANY,

TRADE-MARK. ALBION CHIPMAN, Treasurer, East Cambridge, Mass.



MARSH STEAM PUMP,

Absolute Actuation and Regulation Without Use of Tappets,
Levers or other Mechanical Connections.

FOR MARINE AND STATIONARY BOILERS.

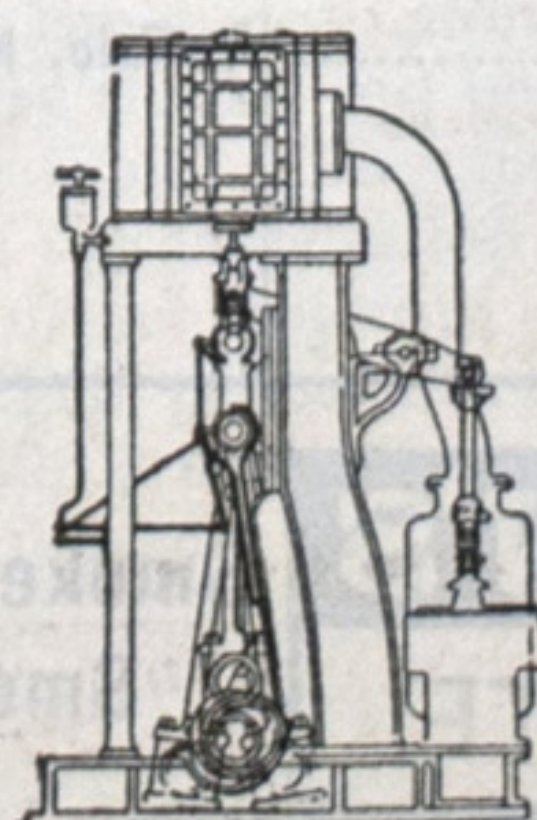
Smaller Sizes With or Without Hand Pumping Attachment.

Exhaust Returned to Boiler. Heats Feed Water Forty to Fifty Degrees, accord-
ing to tests made by Prof. M. E. Cooley, of the University of Michigan.
Steam Valves Actuated by Direct Boiler Pressure.

Has Fewer Wearing Parts than ANY OTHER Steam Pump.

For Circulars and Prices, address
STRONG, CARLISLE & TURNER, Cleveland, O. STANNARD & DILLON, Chicago, Ill.
DETROIT SHEET METAL & BRASS WORKS, Detroit, Mich. H. P. TOBEY, Toledo, O.
SMALLEY BROS. & CO., Bay City, Mich. CARLETON & COLE, Port Huron, Mich.
or BATTLE CREEK MACHINERY CO., Manufacturers, Battle Creek, Mich.

THE O'CONNELL GREASER,



During the past three
years hundreds of ma-
rine engines of from 2,000
to 4,000 h. p. have been
served, as well as high
speed electric light en-
gines.

RESULTS:

Sure control of Crank
Pin.
Stoppage of Lard Oil
account.
Perfectly clean Engine
O'Connell & Cahill,
Manistee, Mich.
Dark lines indicate ap-
paratus.

CON. STARKE.

JOS. WOLTER.

AUG. RIEBOLDT.

RIEBOLDT, WOLTER & CO.,

SHIPBUILDERS,

SHEBOYGAN, WIS.

FLOATING DRY DOCK WILL LIFT VESSELS OF 400 TONS.

H. D. ROOT, Lorain, O.

Established 1853.

SHIPBUILDING AND GENERAL REPAIRING.

TUGS AND STEAM YACHTS A SPECIALTY.

ERIE RUBBER CO.,

ERIE, PA.,

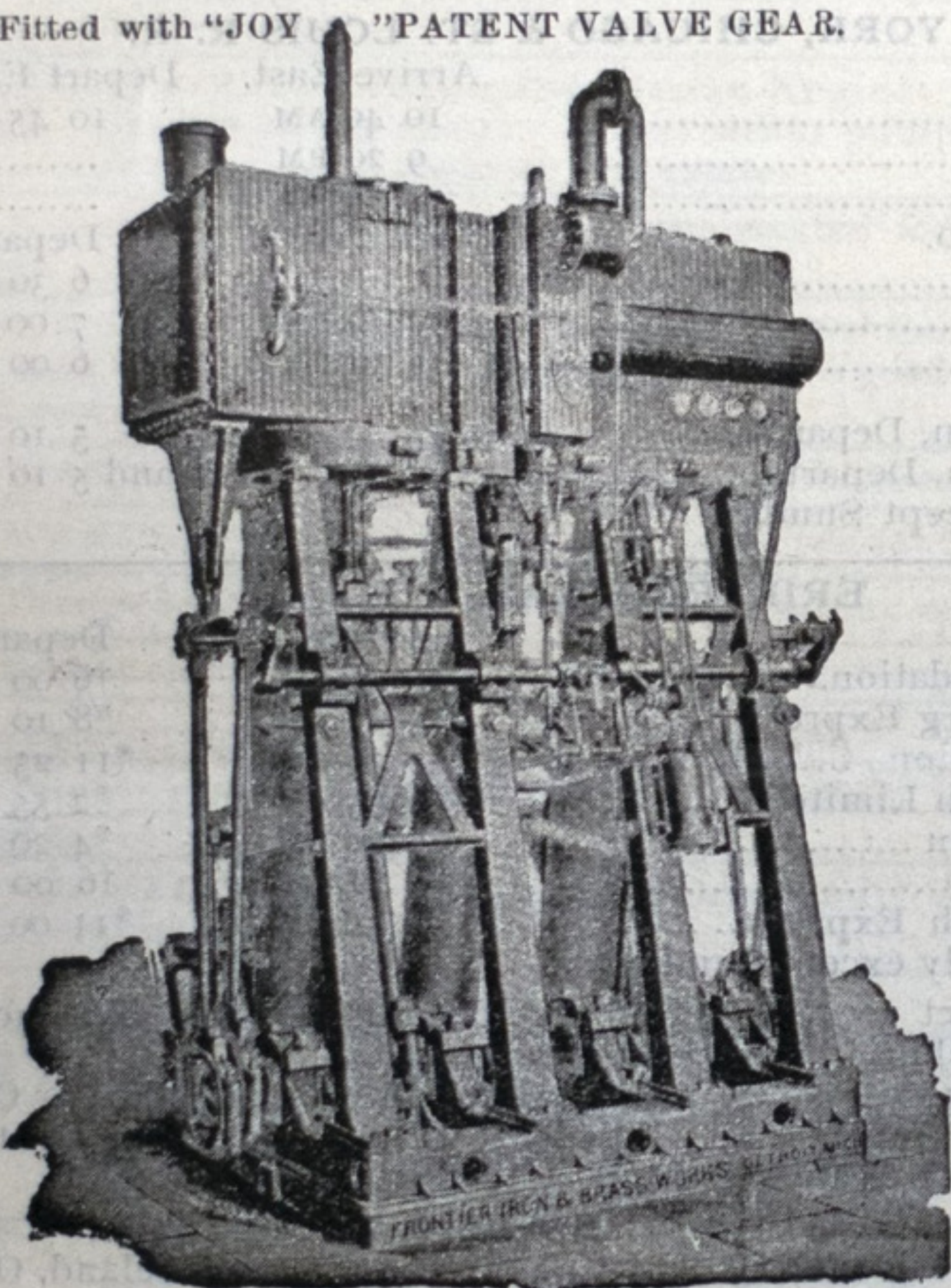
—MANUFACTURERS OF THE—

KEYSTONE MARINE VALVE.

These RED, AIR AND FOOT VALVES, are the Best Rubber Valves made.

THE FRONTIER IRON WORKS,

Fitted with "JOY" PATENT VALVE GEAR.



DETROIT, MICH.,

Builders of

TRIPLE EXPANSION

and all kinds of

Marine Engines

Engines furnished for Steamships:

T. W. Palmer,
Livingstone,
Majestic, Tampa,
John Mitchell,
Nyanza, Fedora,
Geo. F. Williams,
Mackinaw,
Keweenaw,
Jno. Harper,
W. F. Sauber,
and Iosco.
Panther, (fore and aft compound)

MANHATTAN SELF-LUBRICATING PACKING.

Is the BEST to be had for Steamers, Locomotives, Stationary Engines, Pumps, with oil, hot or cold water Valves, Steam Hammers, etc. It is made round and square. Send for circulars, or sample for trial to

GREENE, TWEED & CO.,

83 Chambers Street,

New York, N. Y.

J. D. WILSON.

M. HENDRIE.

Montague Iron Works,

MONTAGUE, MICH.

WILSON & HENDRIE, Proprietors.

MANUFACTURERS OF

Marine Engines and Boilers,**AND GENERAL MILL MACHINERY.**

HENRY B. BURGER.

GEORGE B. BURGER.

H. B. & G. B. BURGER,

MANITOWOC, WIS.

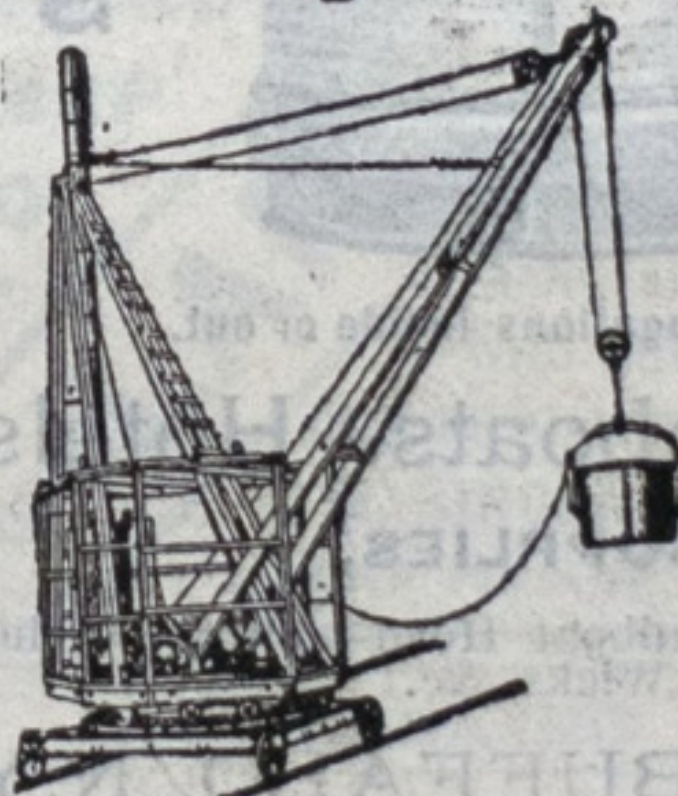
Ship Builders and Contractors.

Dock will admit vessels of 1200 tons and boxes will lift 350 ton vessels. Yard is fitted with a large spar derrick, and a stock of spars always on hand.

McMyler Manufacturing Co.,

180 Columbus St., Cleveland, O.

Sole Manufacturers of the

McMYLER PATENT Revolving Steam Derrick

General Hoisting and Conveying Machinery,
Ore and Coal Buckets and Dump Cars.

DIRECTORY OF LAKE DRY DOCKS,

Giving Dimensions and Location of all Important Docks, for Information of Owners and Masters.

DOCK.	LOCATION.	Length on Keel Blocks.	Width of Gate.	Depth of Water on Sill and Keel Blocks.	SPECIAL ADVANTAGES.	FOR NIGHT SERVICE.
Bay City Dry Dock & Ship Y'd Co.	Bay City, East Side River,....	310	42½-43½	13-14	Nearest Dock to Mackinaw and Sault Ste. Marie.	Call Foreman Edward Trahan, cor. McEwan and Water Sts.
Cleveland Dry Dock Co.	Cleveland, So. Side River Bed,	312	40 ft. 8 in.	11½-12	Nearest Dock to Harbor Entrance.	Watchman at Dock. Manager, 75 Duane St. Foreman, 126 Fulton
Clark Dry Dock Co.	Detroit, Lower Docks,.....	{ 360 220	{ 68 42	10½ { 9 upper 11½ { 10 end.	.....	Watchman at Dock will call Superintendent.
Detroit Dry Dock Co.	Detroit, Upper Docks,.....	{ 239	{ 42 ...	{ 8 ...	.....	Watchman at dock to answer calls.
Ship Owners' Dry Dock Co.	Cleveland, Head Old River Bed	340	50	18	Depth of water enables loaded vessels to dock here.	Call Watchman.
Union Dry Dock Co.	Buffalo,..... { Upper, Lower,	343 343	{ 48 44	{ 10½ 15½	Three steam derricks connected with each dock.	Call watchman.
Wolverine Dry Dock Co.	Pt. Huron, near Water Works.	200	40	14	Dock Waterlogged Vessels.	Watchman at Dock, nights and Sundays to call foreman.
R. Mills & Co.	Buffalo, N. Y.	{ 280 320	{ 40 46	{ 12 13½	Boom Derricks.	Call Watchman.

DIXON'S
GRAPHITE
PAINT

Smoke-Stacks, Boiler-Fronts, Locomotive and Steamboat Stacks,
Smoke Arches, Ash-Pans, Steam-Pipes and other Iron-Work.

If you have use for such an article it will pay you to send for circular and testimonials.

JOSEPH DIXON CRUCIBLE CO., JERSEY CITY, N. J.

DIXON'S
GRAPHITE
PAINT